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Cover: Some of the production tubes, wasters, and finished beads found in and around Rouen, France. As an indication of scale, the round bead adorned with dots in the upper center is 16.8 mm in diameter (© Musée-Métropole-Rouen-Normandie; Cliché Yohann Deslandes).
Inside back cover: Detail of the Lokono apron in Figure 9 (p. 27) of Oehrl's article.

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KARLIS KARKLINS, editor

CONTENTS

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EVIDENCE OF EARLY 17TH-CENTURY GLASS BEADMAKING IN AND AROUND ROUEN, FRANCE

Karlis Karklins and Adelphine Bonneau

Material evidence of a drawn glass beadmaking industry during the early part of the 17th century has been recovered from several loci in and around Rouen, France. Housed in the Musée des Antiquités in Rouen, the material is comprised of production tubes and wasters (most of which exhibit evidence of a speo *heat rounding), as well as finished beads. It is significant as many of the recorded varieties have correlatives at archaeological sites in eastern North America occupied during the late 16th and early 17th centuries. These include such distinctive types as seven-layer chevrons, a Nueva Cadiz variety, and frit-core beads. It is, therefore, quite possible that some of the American specimens may have originated in northern France and not just Venice or Holland as is commonly believed.*

INTRODUCTION

While there is quite a bit of historical documentation regarding the production of glass beads in and around Rouen, France, during the early post medieval period (e.g., Loewen 2019), material evidence for it is rather limited (Cabart 1995; Dussubieux 2009). It was therefore of great interest to learn of a collection of drawn bead production tubes and beadmaking wasters held by the Musée des Antiquités in Rouen (inv. no. 1718.1.2 [D]). Attributed to the beginning of the 17th century, some of the material (ca. 48 items) was recovered in 1869 by Mr. Jacques-Michel Thaurin during street construction at the intersection of rue Jeanne-d'Arc and rue du Gros-Horloge in the old part of Rouen (Musée départemental des Antiquités 2014). Another specific find site noted by Thaurin is "*Hotel de ville ouest, rue étoupée*," an area about 0.35 km north of the previous site, which apparently yielded a single black tube. The collection also contains material (ca. 436 pieces) from other, unspecified sites in the city and surrounding area, some of which was collected by the Abbé Cochet (1871) in the latter part of the 19th century. In the descriptions that follow, material from the construction site is designated as "Thaurin" while that from other sites is denoted as "regional."

THE ROUEN BEAD ASSEMBLAGE

The Thaurin material was initially evaluated and cataloged by Karklins based on color images provided by the Musée des Antiquités. Subsequently Bonneau visited the museum and was able to examine the actual specimens and obtain detailed descriptions. The glass varieties are identified using the classification system devised by Kenneth and Martha Kidd (1970) and expanded by Karklins (2012). Varieties not recorded by the Kidds are marked by an asterisk (*). Colors are designated using the names and codes presented in the *Munsell Bead Color Book* (Munsell Color 2012). Diaphaneity is described using the terms transparent (tsp.), translucent (tsl.), and opaque (op.). The frit-core beads are classified using the typology presented by Karklins and Bonneau (2018). All measurements are in millimeters (D: diameter, L: length).

The material in the bead assemblage falls into two major categories: 1) production tubes and 2) finished beads and production rejects.

Production Tubes

A variety of bead production tubes are represented. Since they could be used to produce both tubular (Kidd classes I and III) and rounded (Kidd classes II and IV) varieties, Kidd and Kidd codes for both are provided below.

Ia1 / IIa1-3; op. barn red (10.0R 3/8); D: 4.2-4.6, L: 25.7-41.7; Thaurin n=3 (Figure 1).

Ia2 / IIa6-8; op. black (N 1/); D: 9.9-16.1, L: 14.5-50.3; regional n=120+, rue rue Étoupée n=1 (Figure 2).

Ia3 / IIa9-10; tsp. light gray; D: 4.9, L: 41.6; regional n=1.

Ia* / IIa*; op. oyster white (N 8/); D: 3.8, L: 42.6; Thaurin n=1 (Figure 3, middle).

Figure 1. Red production tubes (all photos © Musée-Métropole-Rouen-Normandie; Cliché Yohann Deslandes).

Figure 2. Black production tubes.

Figure 3. Various production tubes.

Ia7 / IIa17; op. mustard gold (2.5Y 6/8); D: 7.1-31.7, L: 11.6-24.9; regional n=200+ (*see* cover). At some point, these specimens and the intact and malformed light gold specimens listed below were strung into two necklaces.

Ia* / IIa*; tsp. turquoise green (5.0 BG 4/8); D: 8.1-8.8, L: 9.4-56.0; regional n=3 (Figure 4).

Figure 4. Turquoise green production tubes.

Ia* / IIa*; tsp. bright aqua blue (2.5B 6/7); D: 2.2, L: 12.5-15.9; regional n=2 (Figure 5, row 1, nos. 5-6).

Ia* / IIa*; tsl. copen blue (5.0PB 5/7); D: 2.8-5.7; L: 12.4-15.1; regional n=3 (Figure 5, top row, nos. 1, 4, 7).

Ia18 / IIa52-54; tsl. ultramarine (6.25PB 3/12); D: 4.0-10.7, L: 70.0-86.7; Thaurin n=1, regional n=1 (Figure 6, top).

Ia19 / IIa55-57; tsl. bright navy (7.5PB 2/7); D: 10.6-10.8, L: 63.2-140.0; Thaurin n=4 (Figure 6, bottom four).

Ib7 / IIb*; op. oyster white (N 8/) with 3 barn red (10.0R 3/8) and 3 copen blue (5.0PB 5/7) stripes alternating around the bead; D: 7.3, L: 36.5; Thaurin n=1 (Figure 3, top).

Ib*(?) / IIb*(?); op. white (N 9/); linear marks on the surface suggest that this bead may originally have been decorated with stripes; D: 10.9, L: 35.0; regional n=1.

Ib* / IIb56(?); tsp. cerulean blue (7.5B 4/8) with 3 op. white stripes; D: 11.9, L: 18.0; Thaurin n=1 (Figure 7, center).

Ib* / IIb*; tsl. ultramarine (6.25PB 3/12) with 6 white stripes; D: 10.4, L: 75.6; Thaurin n=1 (Figure 3, bottom).

Ibb* / IIbb*; op. black (N 1/) with 4 barn red-on-white stripes; D: 8.3-8.5, L: 100.5-100.9; Thaurin n=2 (Figure 8).

Ibb* / IIbb*; tsl. mist blue (10.0B 6/3) with 3 barn red-on-white stripes; D: 9.4, L: 26.7; Thaurin n=1 (Figure 3, bottom).

IIIk* / IIIm1; chevron with seven layers: tsl. dark blue (7.5PB 2/5) exterior/ op. white/ op. barn red (10.0R 3/8)/ op. white/ tsl. dark blue/ op. white/ tsl. light blue core; D: 10.4-15.2, L: 11.6-12.3; Thaurin n=2 (Figure 9).

Figure 5. Production tubes, malformed beads, and finished beads.

Finished Beads and Production Rejects

There are a number of finished beads, as well as several that were broken during manufacture and quite a few malformed specimens including examples of beads joined side to side and end to end indicating heat rounding using the *a speo* method (Karklins 1993). Non-glass beads are represented by two malformed frit-core specimens.

IIa17; round (includes oblate and barrel shaped); op. mustard gold (2.5Y 6/8); D: 6.3-11.7, L: 5.9-11.8; regional n=52 (Figure 10).

IIa*; oval; op. mustard gold (2.5Y 6/8); D: 7.1-8.8, L: 11.3-31.4; regional n=47 (Figure 10).

IIa*; round; op. jade green (7.5G 5/6); D: 4.0-6.7, L: 3.7-10.3; Thaurin n=3 (Figure 11, center and upper right).

IIa40; round to barrel shaped; op. robin's egg blue (5.0B 6/6); numerous bubbles in glass; D: 3.9-8.7, L: 4.1-8.2; Thaurin n=11 (Figure 5, row 1, no. 8, row 2, nos. 1-4; Figure 11).

IIa43; round to barrel shaped; tsl./op. bright blue (5.0B 5/7); D: 5.8-7.8, L: 5.2-8.2; Thaurin n=7 (Figure 5, row 2, no. 6; Figure 11).

IIa*; oval/barrel shaped; op. light gray blue (7.5B 6/2); D; 6.5-9.1, L: 9.2-11.4; regional n=2 (Figure 10, lower left & upper center).

IIa*; round; op. copen blue (5.0PB 5/7); D: 5.6; L: 6.9; regional n=1.

IIa52; round; tsp. ultramarine (6.25PB 3/12); D: 6.9, L: 7.7-8.3; regional n=2 (Figure 10, bottom center).

IIa55; round; tsl. bright navy (7.5PB 2/7); D: 6.4, L: ca. 6.6; Thaurin n=7 fused (Figure 11, bottom).

IIa*; oval; op. bright navy (7.5PB 2/7); D: 6.3-6.6, L: 6.9-10.2; regional n=2 (Figure 10, top).

Figure 6. Ultramarine and bright navy production tubes.

Figure 9. Production tube: blue seven-layer chevron.

Figure 7. A broken Nueva Cadiz bead (left) and production tubes.

Figure 8. Striped production tubes.

Figure 10. Various beads strung into a necklet.

IIIc'*; tubular; twisted square cross section; tsp. cerulean blue (7.5B 4/8) exterior/ op. white middle layer/ tsp. cerulean blue core; one end exhibits diagonal grinding to show the interior layers, the other is broken; Nueva Cadiz style; D: 7.8-13.3, L: 25.2-29.2; Thaurin n=2 (Figure 7, left).

Type 2 frit-core bead with an oval op. bright navy (7.5PB 2/7) body decorated with four rows of three dots and four longitudinal stripes in white; D: 10.6, L: 17.4; Thaurin n=1 (Figure 12).

Type 6 frit-core bead having a round op. ultramarine (6.25PB 3/12) body encircled by a wavy white line. In each undulation of the line is a floral design composed of 6 op. light sky blue (7.5B 7/6) dots around an op. light orange (10.0YR 7/10) dot; D: 16.8, L: 13.8; Thaurin n=1 (Figure 13).

Figure 11. Various production rejects.

Figure 12. Type 2 frit-core bead.

Figure 13. Type 6 frit-core bead.

DISCUSSION AND CONCLUSION

The material described above provides incontrovertible proof that drawn glass beads were produced in and around Rouen during the early 17th century. It remains unclear, however, if the material represents a glassworks that both produced the canes and transformed them into beads, or small workshops – likely in beadmakers' homes as was common practice at the time – that utilized canes obtained from a nearby glassworks (Loewen 2019), or both. The absence of glass-production wasters in the collection seemingly rules out a glassworks but it is not known if wasters were encountered but not collected.

Many of the Rouen bead varieties have counterparts at sites occupied during the late 16th and early 17th centuries in eastern Canada and the northeastern United States. The most distinctive of these are the chevron, Nueva Cadiz, and frit-core beads. Keith J. Little (2015) provides an excellent synthesis of the distribution of the two former types in northeastern North America, the majority of which come from sites attributed to the early 17th century. The two frit-core beads have correlatives as well. Type 2 has been found at six sites in New York state and eastern Pennsylvania dating to 1510-1670, while Type 6 is present at a site in southern Quebec and another in eastern New York state, both attributed to the 1571-1614 period (Karklins 2016, 2019).

The source of these diagnostic beads has long been a point of debate. Some have contended that the chevron and Nueva Cadiz beads – especially those found at more southerly sites in Pennsylvania and Virginia – could have derived from Spanish sources to the south (Smith and Good 1982). Such an origin is far less likely for these beads found at more northerly sites. Given that these bead types have been found in Rouen, the likeliest explanation is that they originated at beadmaking workshops scattered over northern France, possibly even those represented by the collection under discussion.

Coupled with finds of frit-core beads in Paris (Turgeon 2001) and lacking finds elsewhere in Europe, the presence of the two frit-core beads – both of which appear to be production rejects – among the wasters adds credence to the hypothesis that they are a product of France. Along similar lines, the IIa40 robin's egg blue beads which typically contain abundant tiny bubbles support Peter Francis' (2009) contention that beads of this type – which he termed "bubble glass beads" – were made in France. While corroborative evidence from other bead production sites in France has yet to be forthcoming, French archaeologists are investigating glassmaking sites of the 16th-17th centuries and may eventually provide it.

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GLASS AND ENAMEL BEADMAKING IN NORMANDY, CIRCA 1590-1635

Brad Loewen

*The archaeological study of glass bead proveniences raises theoretical questions regarding the idea of "beadmaking centers" as defined by typological, technological, and geochemical means. Also important for defining beadmaking centers are historical sources in various languages. In the 19th century, French scholars interested in glassmaking in Normandy noted beadmaking ca. 1590-1635. Their publications show a rural cottage industry in the county of Eu and the forest of Brotonne, and an urban guild of patenôtriers in Rouen. While the historical data mostly show the production and export of rosary beads, the Normandy "beadmaking center" coincides with a major outfitting region of the late 16th and 17th-century transatlantic fur trade. This geographic correlation allows us to hypothesize that some French beads found in North America may have originated in Rouen. Interestingly, an archaeological collection from 1869 contains a chevron bead production tube and two frit-core (*faïence*) beads, similar to North American examples, in a Rouen production context.*

INTRODUCTION

While the origins of glassmaking in Normandy are medieval, its written record only begins in the 15th century. From this time until 1873, no less than 59 glassworks existed in Normandy with about a third of these in operation at any given time. Each glassworks had a *privilège* – a licence including a limited patent on products, conditions on fuel procurement, etc. – that promoted specialization in certain types of glass and finished products. Some glassworks fabricated tubes called *canons* that they sold to beadmakers. In two rural areas, beadmakers cut *canons* into short lengths and modelled them in small ovens built into the chimneys of their houses. Some made their own *canons* out of crushed glass if their oven was suitable to the task and the local glassworks tolerated the competition. Reflecting their principal use in rosary strands, beads were called *patenôtres* ("our-fathers") and their makers, by extension, *patenôtriers*.

We do not know when *patenôtriers* began working in Rouen, but they were able to form their own guild in 1593. Members enjoyed the right to make and sell *canons*, and some applied strands of different-colored glass onto the tubes to create striped beads. Rouen *patenôtriers* exported rosary beads as far away as southwest France, Spain, and Portugal. In 1605, a crystal glassworks opened in the suburb of Saint-Sever. Using techniques said to compare with the highest Venetian standards, the factory also produced *canons* for beads, triggering a legal battle with the *patenôtriers*' guild that left a valuable record of beadmaking in Rouen.

For archaeologists who study European beads found in consumers' contexts in North America, it is significant that the Normandy beadmaking region corresponds with the area in France where many transatlantic fur-trading ventures were organized in the early 17th century. This paper contributes to the concept of a "beadmaking center" and hypothesizes that Normandy, and particularly Rouen, may have produced some of the beads found in northeastern North America in contexts from about 1600 to 1670.

THEORIZING "BEADMAKING CENTERS" ACCORDING TO THEIR MODE OF PRODUCTION

Theorizing "beadmaking centers" is vital to the study of bead proveniences. While a full theorization is beyond the scope of this paper, we may contribute by classifying the known centers according to their mode of production. Based on a literature review, we find seven European centers from the 15th to the 19th centuries that fall into three categories. Firstly, we have urban beadmakers, organized in guilds and clustered in the neighborhoods of Murano in Venice and Montorgueil in Paris. Each city had up to 20 or 30 workshops (Francis 2008; Turgeon 2001).

Secondly, in three rural border areas of Bohemia and Bavaria, beadmakers worked in dispersed farms or hamlets, using small ovens that enabled families to supplement their subsistence with cash income. They obtained raw materials from merchants residing in Nuremberg, Bayreuth, and Gablonz, who also marketed the beads. Archival and archaeological research on beadmakers in the Bavarian and Bohemian forests from the 15th century to the late 19th century identified 61 beadmaking ovens in the area

(Karklins 2019), while a survey of the Fichtelgebirge region to the north near Bayreuth revealed that 15 beadmaking furnaces operated there between 1440 and 1800 (Karklins et al. 2016).

Thirdly, in 17th-century Holland and London, financiers with connections to the colonial trade founded glassworks that also produced beads. Often short-lived, these factories had salaried workforces and were strategically located to sell their products to major colonial trading companies. The factory model was similar to the faience, porcelain, and pewter industries of the same period (Karklins 1974; Karklins, Dussubieux, and Hancock 2015).

Each mode of production had implications for the techniques and distribution patterns we see in archaeology. In Normandy, we find rural and urban beadmaking, but no industrial bead factory.

BEADMAKING IN FRANCE AND HOLLAND

Beadmaking in Normandy was influenced by developments in the adjacent centers of Paris and Holland. In Paris, Laurier Turgeon (2001) has studied beadmaking based on notarial contracts and postmortem inventories from 1562 to 1610. He identifies 37 *patenôtriers* who worked in glass, enamel or frit-core, shell, jet, coral, and amber. The techniques for working glass and enamel include drawing, lamp-winding, and mold pressing. A Paris archaeological assemblage from the 1590s, with parallels to the materials and techniques that Turgeon found historically, includes several beads that correspond to types found in North America (Turgeon 2001). Chemical analysis of two Parisian archaeological collections shows a variety of recipes at work (Dussubieux and Gratuze 2012). In 1565 and 1587, the Parisian bead merchant Charles Chelot supplied La Rochelle and Bordeaux merchants involved in the Canadian fur trade. Evidence of the Paris beadmaking industry thus precedes that from Rouen by about 30 years and some early Rouen beadmakers, notably the Delamare family, possibly originated in Paris (Turgeon 2019:189-190). In writing about French beadmaking, researchers often cite relevant passages from two historical works, *L'art de la verrerie* by Jean Haudicquer de Blancourt (1718 [1697]), and *Dictionnaire universel du commerce* by Jacques Savary de Bruslons (1723), which have been translated in Appendices A and B (q.v.) for easier reference.

As for Dutch bead production, Karlis Karklins (1974) has identified seven factories, in five cities, that operated for spans of 20 or 30 years between 1597 and 1697. Archaeologists have studied three of the Amsterdam factories and compared their beads to examples found in North America (Karklins et al. 2001, 2002). Bradley (2007:41-43) has proposed a chrono-typology of beads in the Dutch colonial trade from ca. 1614 to 1665. In noting similarities between beads found on French sites in North America and types fabricated in Holland, he has also asked whether Champlain carried Dutch-made beads to Canada (Bradley 2014).

There is some debate regarding the influence of Venetian beadmakers, celebrated for their technical prowess, on Dutch, French, and English production and colonial trade. Some authors have suggested that beads made in Venice found their way to the Americas (Francis 2008:67, 2009; Lapham 2001). Others believe that the hiring of Venetian artisans enabled beadmakers in northwest Europe to imitate the Venetian style (Turgeon 2001:67). While Norman glassworks hired Italian specialists between 1665 and 1730, any influence they had on beadmaking remains unknown (Le Vaillant 1873:277, 398-401, 410, 532-535; Schuermans 1893:111-113).

BEADMAKING IN RURAL NORMANDY: THE COUNTY OF EU AND THE FOREST OF BROTONNE

In late medieval France, four families enjoyed nationwide hereditary glassmaking rights and they expanded their operations into lands retaken from the English during the Hundred Years War, including Normandy. Their names – Bongars, Brossard, Caqueray, Le Vaillant – were still prominent in the French glass industry of the 19th century (Le Vaillant 1873:1, 22). Their rights were not exclusive, however, and other players quickly entered the field.

In 1873, Onésime Le Vaillant de la Fieffe, whose family owned the La Haye glassworks in the forest of Lyons, published a history of the Norman glass industry. In addition to scouring various private and public archives, he tapped into a vast network of informants who supplied him with oral traditions and the results of "archaeology." His work mentions two rural beadmaking areas that were active from the 16th to the 18th century (Figure 1). The first was in the Dieppe hinterland, at the adjacent hamlets of Villers and Aubermesnil in the county of Eu. The second area lay about 20 km west of Rouen in the forest of Brotonne, in the villages of La Mailleraye and Jumièges (Le Vaillant 1873:235-236, 266-267).

Given the personal nature of Le Vaillant's text, I have translated the relevant passages, the first of which mentions beadmaking at Aubermesnil and Villers:

> Around the middle of the 16th century, some inhabitants of Aubermesnil and Villers made *patenôtres*. A furnace set up in their chimney served

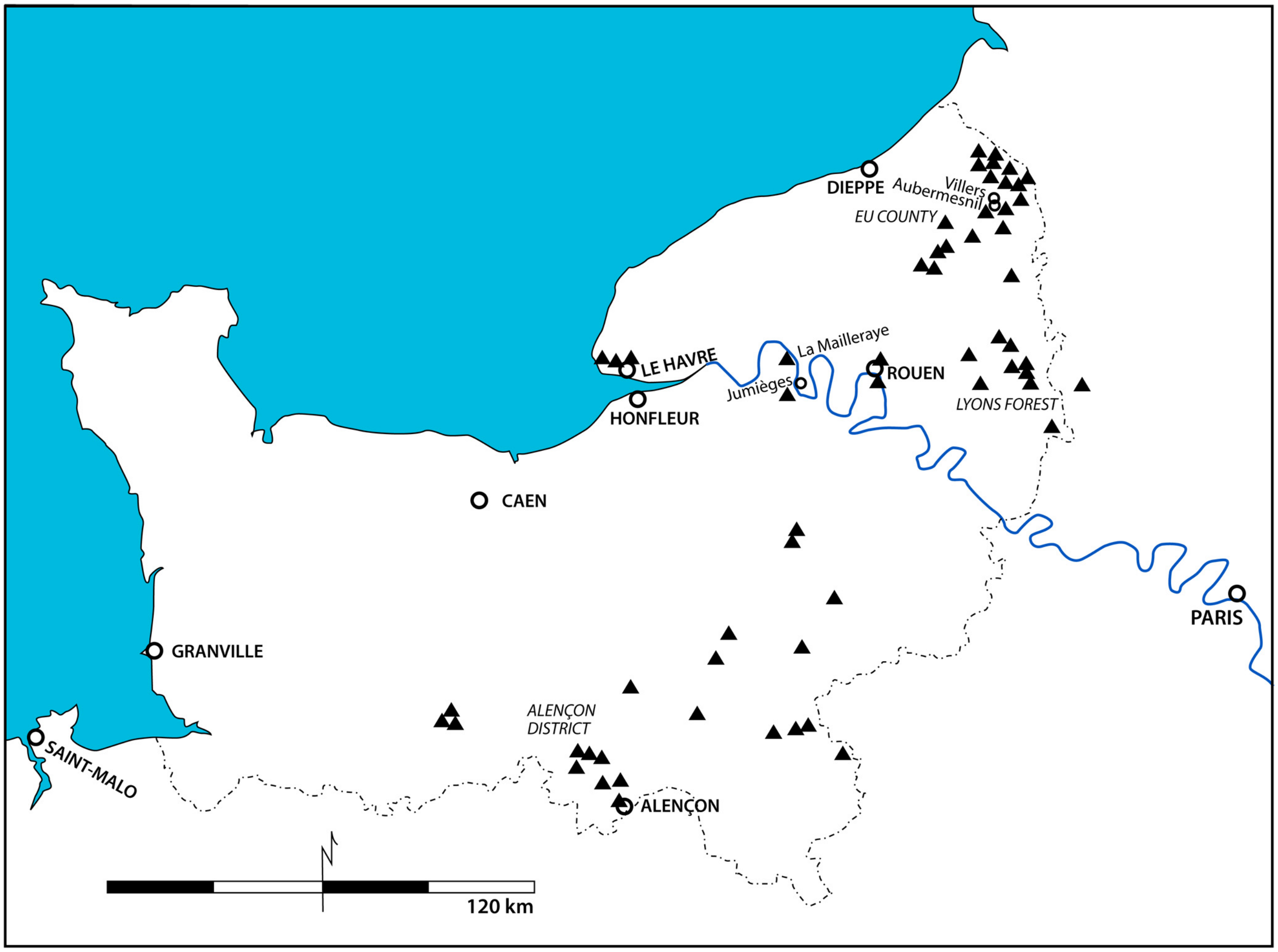

Figure 1. Glassworks in Normandy, 1402-1873 (after Onésime Le Vaillant de la Fieffe 1873) (drawing: Brad Loewen).

> to divide [*diviser*] the *canons* (tubes) made for this purpose in crystal glassworks; the segmented tubes were used to make rosary strands.… It was not a proper industry, but a small craft that anyone could master without apprenticeship or equipment, during one's spare hours.… The glass beads were called *rocaille* and this is what Haudicquer de Blancourt said about them in his *Art de la verrerie*: "All our mercers sell this *rocaille*, which are yellow and green seeds from which rosaries are made and sold to country people. This kind of merchandise is also worn in the Indies, Africa and the Islands. The peoples of these countries adorn themselves by wearing beads around the neck as scarves, on bracelets, or around the waist (Le Vaillant 1873:235-236).

We can retrace the reference to Jean Haudicquer de Blancourt's 1679 work, often cited with respect to beadmaking in France (Haudicquer de Blancourt 1718 [1679], II:132-134) (*see* Appendix B). As for his source for the beadmakers of Eu, Le Vaillant cited an article by Timothée Trimm entitled "Bizarreries de la noblesse" that appeared in *Le Petit Journal*, a major Paris daily newspaper, on 25 June 1868. Trimm cited the historian and heraldist Henri Gourdon de Genouillac (1868:119-120), who mentions Aubermesnil. Only Le Vaillant mentions the *patenôtriers* of Villers, so he must have obtained this detail independently. He may have seen records from the 16th century, or combined historical data with oral tradition. The two adjacent hamlets lie in the county of Eu, southeast of Dieppe, in the heart of a major glass-producing region. Le Vaillant documented no fewer than nine glassworks within 10 km of Aubermesnil and Villers between 1441 and 1873. The two closest ones, Saint-Martin-au-Bosc and Rétonval, were active in the 16th century and they may have supplied the *canons* used by beadmakers in the two hamlets.

Le Vaillant also mentions beadmakers at La Mailleraye and Jumièges, in the forest of Brotonne along the lower

Seine, west of Rouen. This passage cites more substantive sources:

> A glassworking oven for heating and working glass by *patenôtriers* was established at La Mailleraye in the 16th century. We know of this furnace from a ruling handed down by the Norman parliament on 22 December 1595, in a lawsuit opposing Antoine Delisle, a "master glassworker residing at La Mailleraye," who had appealed two sentences "rendered by the jury presiding at Rouen on 8 May and 26 June" of the same year, and Thomas Bodin, "master button-maker and enamel *patenôtrier* at Rouen."
>
> The parliament heard that Delisle had promised to lend Bodin, the first time he used the furnace, a pot for heating cullet [*groisil*; crushed glass] and drawing it into tubes [*canons*]. This glassworks must have taken its fuel from the forest of Brotonne.
>
> Knowing that Dr Guéroult of Caudebec, a town separated from La Milleraye by the Seine, devoted himself energetically to archaeological research, I sought his help. He was unable to obtain any information on Sieur Delisle's establishment, but was told that in Jumièges and the surrounding countryside in the 16th, 17th and 18th centuries, many individuals used glass to make [tubular?] beads, and white and polychrome globules for use by *patenôtriers*.
>
> Presumably, the glass used by these small beadmakers came from the glassworks at La Mailleraye; while the glass may also have come from the Rouen [Saint-Sever] and La Haule [Brotonne] glassworks, the distance from the former must have led beadmakers to prefer glass from La Mailleraye, whereas the La Haule glassworks only existed for a short time. The glassworks operated by Antoine Deslisle must have been sizeable, and surprisingly there is no memory left of it in the area.
>
> In a previous section, I spoke of a similar industry that occupied some inhabitants of two parishes in the county of Eu (Le Vaillant 1873:266-267).

Analysis of these two passages provides a general view of rural beadmaking in Normandy. About 70 km separate the beadmaking areas of Eu and Brotonne, and other rural *patenôtriers* may have worked elsewhere in conjunction with local factories. Rural beadmaking continued from the 16th to the 18th century, but the number of workshops is hard to estimate. Beadmaking appears to have been a part-time activity for rural artisans and their families. They worked at small furnaces built into the chimneys of their houses, and used tubes[1] (*canons*) obtained from glassmakers or made from crushed glass or cullet (*groisil*). Most information refers to monochrome tubes and beads, but artisans at Jumièges also made polychrome globular beads. Beadmakers risked lawsuits from local glassmakers whenever they heated cullet and drew it into *canons*. We have no evidence of the use of enamel in these rural settings, contrary to the situation in the city of Rouen.

BEADMAKING IN ROUEN: THE HISTORICAL EVIDENCE

Authors in the 19th century also published information of beadmaking in the urban context of Rouen. In the 1590s, the Norman capital was home to several beadmakers and, in 1605, saw the establishment of a Venetian-style glassworks that competed with the *patenôtriers* until about 1635. Evidence of this thriving industry was published by three erudites: Alexandre de Girancourt (1867), the same Onésime Le Vaillant de la Fieffe (1873:278), and Charles de Robillard de Beaurepaire (1897:427-429) (cf. Mazauric 2001).

The earliest reference to beadmaking in Rouen comes from an apprenticeship contract in 1591 (Robillard de Beaurepaire 1867:428). In 1593, the Rouen *patenôtriers* requested recognition as a guild and two years later their statutes received royal approval. The charter authorized them to make beads and buttons in enamel, and to use metal to string beads into bracelets, chains, and necklaces in their own ovens (Le Vaillant 1873:278). While most guild members worked in glass and enamel, the community included artisans who fashioned rosaries in ivory, bone, and "exquisite wood" (*see* Léouffre et al. 2019; Lotti 1993). We know the name of one artisan, Claude Martel, from a 1613 apprenticeship contract (Robillard de Beaurepaire 1897:428-429). Two other guild members, Geoffroy and Mathieu Delamare, operated a glass and enamel furnace in the suburb of Cauchoise, northwest of the city (Le Vaillant 1873:278, 287). In 1608, they exported a shipment of "round and olive-shaped rosaries, small black seeds beads, violet seed beads, and other accessories for fabricating rosary chains" to Spain (Mazauric 2001). Another family member, Guillaume Delamare, purchased beads from Paris for the Canadian fur trade in 1610 (Turgeon 2019:190). The Rouen clan may have been related to an eponymous beadmaker in Paris, Jean Delamare (Turgeon 2001:66).

The 19th-century historian gleaned descriptions of Rouen *patenôtres* from records of bead shipments to Béarn, Portugal, and Spain between 1607 and 1629 (Robillard de Beaurepaire 1897:429). Two consignments sent to Béarn in southwest France included 100 dozen beads, and 200 dozen white and red beads (8 May 1607); and bone rosaries and glass beads (19 July 1608). Of two cargos expedited to Portugal, one held 676 thousand yellow beads and 58 thousand beads "*façon et manufacture de Rouen*" (10 January 1607), and the other 200 gilded olive beads, 4 dozen "*buffle*" (buffalo horn) rosary strands, and 5 pounds of amber beads made in Rouen (19 March 1607). Finally, four shipments were destined for Spain: 54 dozen rosary strands with crosses and 30,000 cut-glass garnets (1 July 1608); 200 thousand of "*pois de la Chine*" made in Rouen (25 September 1628); a thousand "*masses*"[2] of small cut-glass garnets "*façon de Rouen*" (13 October 1629); and rosaries "*façon d'Espagne*" made of wood and buffalo horn (15 October 1629). We may translate "*façon de Rouen*" and "*façon d'Espagne*" as styles associated with Rouen and Spain, while "*pois de la Chine*" literally means "China peas."

Rouen *patenôtriers* may have diversified into product lines more typically associated with Venetian-style crystal glassworks. Evidence comes from three notarized sales cited by Claude Mazauric (2001). One contract mentions "glass seeds, crystal seeds, gilded mirrors, reading glasses, *tablettes* and small mirrors, all made in Rouen and its environs" (20 December 1605). Another sale mentions "rosary chains with crosses and cut-glass garnets" (1 July 1608). Mazauric also cites a sale of "glass beads, reading glasses, large gilded mirrors and small mirrors, all made by Rouen *patenôtriers* and their workers" (19 July 1609).

These references show the importance of the market for rosary beads, as well as the capacity and technical range of the Rouen *patenôtriers*. In 1598, the king sought to strengthen the city's glassmaking industry by granting a privilege to two artisans from Mantua, Vincent Busson and Thomas Bartholus, for a glassworks to make crystal and fabricate objects in the Venetian style. The project failed to materialize, so in 1605, the king gave a similar privilege to a glassworker from Aix-en-Provence, François Garsonnet (Girancourt 1867; Le Vaillant 1873:276-308). This factory, built in the suburb of Saint-Sever on the south shore of the Seine,[3] began production about 1608 (Girancourt 1867:7). Hampered by a shortage of firewood, it imported English coal to make crystal as early as 1616, some decades before coal-fired glassworks developed in England (Girancourt 1867:11).

Garsonnet soon clashed with *patenôtriers* already established in Rouen. In 1613, he sued Mathieu Delamare for operating a furnace in the Cauchoise suburb and using it to make *canons*, alleging it violated his own glassworks privilege. In taking up Delamare's defense, the Rouen beadmakers' guild got help from its Paris counterpart, revealing the guilds' shared interest and possibly their links via the Delamare clan. The court ruled that Mathieu Delamare could keep his furnace and use it to make enamel and glass *canons*, for his own purposes and for sale to other Rouen beadmakers (Girancourt 1867:9).

In 1618, Garsonnet transferred the Saint-Sever glassworks to two artisans from Languedoc, Jean and Pierre d'Azémar, and a Rouen merchant named Antoine Girard. The Azémar brothers operated the plant while Girard sold the products (Girancourt 1867:10). The new owners brought in artisans from Languedoc, one of whom moved on to supervise a factory in Eu (Girancourt 1867:17-18). In 1619, Pierre Azémar married his partner's daughter, Anne Girard. After the Azémar brothers died between 1635 and 1642, Girard fought a legal battle to conserve the privilege for her children, although other Rouen glassmakers gained the right to make crystal in 1650 – the last record of the Azémar-Girard family. The Saint-Sever glassworks still operated in 1753 under other owners (Girancourt 1867:20-24).

These archival traces thus show there were several beadmakers in Rouen about 1590-1635, and that they fabricated their own glass tubes or *canons*. The same artisans also made buttons and worked metal to string beads into rosaries, and they may have manufactured mirrors, reading glasses, and other products normally associated with high-quality glassworks. When the Saint-Sever glassworks came on the scene in 1605, its privilege overlapped with the Rouen *patenôtriers*' activities. Although the glassworks likely did not produce beads, it may have fabricated *canons* for beadmakers' use.

Like their Paris counterparts, the Rouen *patenôtriers* used enamel to add a decorative glaze to beads and buttons. On the limited scale of their craft, their enameling techniques were similar to those of glassworkers who made enameled plate and objects. Enamel was a glaze based on tin and lead, and colored by adding various metal oxides (Haudicquer de Blancourt 1718 [1697], II: 3-47)[4] (see Table 1). The use of enamel by Rouen and Paris *patenôtriers* indicates they may have fabricated the "frit-core" beads found in northeastern North America, which have a decorative enamel glaze (Karklins 2016). In French, these beads are called *perles de faïence* in reference to the enamel coating over the frit core and its technological parallels with tin-glazed *faïence* earthenware.

BEADMAKING IN ROUEN: THE ARCHAEOLOGICAL EVIDENCE

In addition to historical evidence of *patenôtriers*, two archaeological discoveries shed light on the Rouen glass and bead industry. In 1972, archaeologists encountered the

Table 1. Recipes for Basic Enamel and Colors (Haudicquer de Blancourt 1718 [1697], II).

Chapter	pp.	Product	Ingredients
148	4-6	Basic enamel to be colored	30 lbs lead, 33 lbs Cornwall tin, calcined together into a lime; 50 lbs of this lime, 50 lbs white tartar frit (ch. 6), 8 oz salt made from white tartar (ch. 15)
149	6-7	Milk-white color	6 lbs basic enamel, 48 grains Piedmont magnesium
150	8-10	Turquoise color	6 lbs basic enamel, 3 oz copper scories [slag] calcined 3 times (ch. 34), 96 grains cobalt, 48 grains magnesium, stir with iron hook
151	11-12	Blue color	4 lbs basic enamel, 2 oz prepared cobalt, 48 grains copper scories calcined 3 times
152	12-13	Other blue color	4 lbs basic enamel, 2 copper leaves, 48 grains cobalt
153	13-14	Green color	4 lbs basic enamel, 2 oz copper scories calcined 3 times, 48 grains iron scories
154	14-15	Other green color	6 lbs basic enamel, 2 oz *Ferret d'Espagne* [hematite] (ch. 22), 48 grains Saffron of Mars [iron sulfide] (ch. 25), vinegar
155	15-16	Other green color	4 lbs basic enamel, 2 oz copper scories, 48 grains Saffron of Mars, stir with iron hook
156	16-17	Black color	4 lbs basic enamel, 2 oz cobalt, 2 oz Piedmont magnesium
157	18-19	Other black color	6 lbs basic enamel, 2 oz cobalt (ch. 17), 2 oz Saffron of Mars with vinegar (ch. 25), 2 oz *Ferret d'Espagne* (ch. 32)
158	19-20	Other black color	4 lbs basic enamel, 4 oz red tartar, 2 oz Piedmont magnesium
159	20-23	Purple color	4 lbs basic enamel, 2 oz Piedmont magnesium (ch. 164)
160	23	Other purple color	6 lbs basic enamel, 3 oz Piedmont magnesium, 6 oz copper scories calcined 3 times
161	24-25	Violet color	6 oz [sic] basic enamel, 2 oz Piedmont magnesium, 48 grains copper scories calcined 3 times
162	25-26	Yellow color	6 lbs basic enamel, 3 oz tartar, 62 grains prepared magnesium
163	26-28	Basic crystal to make red enamels	48 lbs sodium salt (ch. 5), 16 lbs white tartar (ch. 6), mixed into loaves; add 4 lbs lead and tin lime (ch. 148), 4 lb calcined white tartar (ch. 5)
164	28-30	Fusible magnesium for red enamels	Equal weights of Piedmont magnesium and nitrous salt, calcined 24 hours; wash to remove nitrous salt and leave to dry; add an equal weight of ammonium salt and grind while spraying with vinegar; leave to dry; precipitate 12 hours in a glass vase; replace the precipitated ammonium salt, repeat as needed until the magnesium remains at the bottom of the vase

remains of a small glass workshop from the 17th century in Rue Saint-Lô during the construction of a shopping center called L'Espace du Palais, revealing a variety of small personal adornments but few beads (Dussubieux 2009). In 1869, however, roadbuilders unearthed beads from about 1600 at the corner of Rues du Gros-Horloge and Jeanne-d'Arc. An antique collector, Jacques-Michel Thaurin, obtained the beads and donated them along with many medieval and post-medieval glass objects to the Musée départemental des Antiquités in Rouen (Barrera 1990; Davison 1972:v). The beads are still at the museum (inv. no. 1718.1.2 [D]) and a selection has been photographed (Figure 2).

Figure 2. Beadmaking wasters found at the Rue du Gros-Horloge site, as well as two strands of beads from another site (© Musée-Métropole-Rouen-Normandie; Cliché Yohann Deslandes).

The photograph shows black and dark blue production tubes, as well as several beads. Of special interest are two frit-core (*faïence*) beads decorated with dots and stripes on a navy blue background, and a production tube for seven-layer chevron beads (*see* Karklins and Bonneau 2019). These highly diagnostic beads resemble examples found in northeastern North America (Figures 3-4), and are generally assigned to Glass Bead Period 1 (1580-1600) or, in some cases, to the early 17th century (Karklins and Bonneau 2018). Present in northeastern North America during a short period, frit-core (*faïence*) beads occur in eight varieties. The Rouen examples correspond with Types 2 and 6 (Karklins 2016; Karklins and Bonneau 2018).

Chevron beads, found in many varieties on Spanish colonial sites, had a limited circulation in northeastern North America. The seven-layer type seen in the Rouen photograph has a close parallel at Red Bay, Labrador, on a whaling and sealing site occupied by Basques from Spain about 1543-1635 (Delmas 2016:81-84). Other types of chevron beads have four layers: one is tubular and sometimes faceted, found in the Saint Lawrence and Saguenay valleys; the other is spherical and appears to have emanated from Dutch trading posts in the Mohawk Valley (Loewen 2016:279-281).

Figure 3. Type 2 frit-core or *faïence* bead (photo: Adelphine Bonneau; courtesy Laboratoire et Réserve d'archéologie du Québec).

NEW FRANCE TRADE MONOPOLIES AND THEIR SUPPLY NETWORKS, 1599-1663

The Norman bead industry is important for North American researchers interested in bead proveniences because this region was the seat of several companies that held a monopoly over the fur trade in New France from 1599 to 1663. We may assume that these companies expedited most of the beads found in archaeological contexts related to the fur trade. Thus, the geography of their outfitting networks in France is an important clue to the provenience of beads found in northeastern North America, especially if the supply region included a beadmaking industry. As well, their chronology correlates well with the Glass Bead Periods widely used by archaeologists for the study of beads

Figure 4. Seven-layer chevron bead found at Red Bay, Labrador (EkBc-17-4272) (photo: Vincent Delmas; Delmas 2016:81).

found in northeastern North America (Kenyon and Kenyon 1983). We may look at these companies as they relate to the Norman bead industry and the chrono-typology of beads found in North America.

In a recent study, Turgeon (2019:101-134) documents the origins of the Normandy fur trade along the Atlantic coast from 1559 to about 1600. "While Cape Breton Island, Nova Scotia and the coasts of the Gulf of Maine have generally been considered as places of lesser importance in the early fur trade, it is truly here that the trade was born" (Turgeon 2019:107). The incipient trade belonged to a loose network of outfitters and captains from several French Atlantic ports, but especially from Rouen. For this period, Turgeon (2019:190) cites three sales of glass beads from Paris to fur trade outfitters headed to this coast, including one to the Rouen trader Guillaume Delamare whose relatives were *patenôtriers*.

During the initial period of the French fur trade monopolies, from 1599 to 1627, charter companies based in Normandy outfitted their supply ships at Honfleur, Dieppe, Rouen, and Le Havre. Although the companies restructured on two occasions, Samuel de Champlain remained their representative in New France. From 1599 to 1510, the principal outfitter and shareholder was Aymar de Chaste, the governor of Dieppe, who had extensive interests in Rouen. During these years, Champlain outfitted his voyages in Honfleur, and other supply ships left from Havre-de-Grâce (Le Havre). From 1610 to 1621, under the restructured *Compagnie des Marchands de Rouen et de Saint-Malo*, Champlain continued to sail out of Honfleur. When the shareholders reorganized to create the *Compagnie de Montmorency*, active from 1621 to 1627, control of the colonial trade shifted back to Dieppe and Rouen, where Champlain's ships took on their cargo for New France (Allaire 1999:74-83). The period of these companies coincides with the greatest visibility of Norman beadmaking, as well as with the dates of Glass Bead Period 2 (1600-1630) in northeastern North America.

From 1627 to 1663, the trade monopoly of New France fell to the *Compagnie des Cent-Associés*, named in recognition of its hundred shareholders. Based in Paris, the company had a complex structure allowing it to draw capital, supplies, and merchandise from several regions of France (Trudel 1983). It tolerated other actors in New France, notably the *Société de Notre-Dame* from Paris that founded Ville-Marie (Montréal) and conducted trade on Montréal Island (Trudel and Baboyant 1992). A subsidiary company based in La Rochelle, the *Compagnie de Miscou*, controlled trade in Acadia, although infighting in 1643 opened the door to investors from Nantes who financed and outfitted posts on Cape Breton Island, under Nicolas Denys. Thus, merchants from Paris, La Rochelle, and Nantes gained footholds in several regions of New France.

Normandy returned to the forefront of the colonial trade between 1652 and 1663, when the parent company received an injection of capital from the *Compagnie de Rouen*, in exchange for trade goods drawn from this city. During this period, coinciding with Glass Bead Period 3 (1630-1670), beads may have come from several French regions, some of which traded into specific regions of New France. For example, La Rochelle and Nantes outfitters traded into Acadia.

In 1663, the French crown abolished the system of trade monopolies and assumed direct control of New France. Colonial governance fell to the Ministry of the Marine and the Colonies, with an administration in Québec City overseen by an intendant and a council. Lasting until the British conquest of New France in 1759, this historical phase corresponds to Glass Bead Period 4 (1670-1760). Some individual traders based in Québec City and Montréal maintained their own transatlantic supply networks. As seen from the wreck of *La Belle*, in 1684 the Rochefort arsenal expedited a box of blue beads for René-Robert Cavelier de La Salle (Perttula and Glasscock 2017).

There is a striking symmetry between the periods of French colonial trade and North American bead chrono-typologies, or Glass Bead Periods. Each period brought greater complexity to transatlantic bead supply and distribution networks. Glass Bead Period 2 (1600-1630) stands out for the relative homogeneity of its bead types and this period corresponds to the time when Norman companies dominated the colonial trade. More research is needed to characterize the beads of this period, both in France and in North America, in order to explore their provenience.

CONCLUSION

While researchers have identified several "bead production regions" in Europe, one region documented by three 19th-century erudites in Normandy has hitherto escaped attention. Stimulated by a large regional glassmaking industry, beadmaking took place on a limited scale in at least two rural areas in the county of Eu, near Dieppe, and in the forest of Brotonne, near Rouen. An urban industry existed in Rouen as early as the 1590s, organized on a model similar to that of Paris or Venice at the same time. It mainly produced rosary beads, but sales contracts also show a variety of other small glass products. This professional community made its own crystal tubes, called *canons*, and also worked with enamel, raising the possibility of a link with glazed frit-core beads found in late 16th- and early 17th-century contexts in northeastern North America.

There seems to be a possibility that the Rouen and Norman beadmakers supplied the fur trade companies operating in New France, if we consider the fur trade's 16th-century origins in Rouen and the 17th-century companies' base in Normandy. The potential link between Norman beadmakers and bead varieties found in North America is strongest for the period from about 1590 to 1635. As a contribution to the archaeological study of bead proveniences, this paper places Normandy on the map of potential origins for beads found in North America.

APPENDIX A. TRANSLATION OF "*RASSADE*" AND "*VERROTERIE*" BY JACQUES SAVARY DE BRUSLONS (1723, II:1282, 1936)

RASSADE (tome 2, column 1282), which some inappropriately call and write RAZADE. This is a kind of *verroterie*, or small glass grains in diverse colors, with which the Negroes of the coasts of Africa and the peoples of America adorn themselves, and which one gives them in exchange for quantities of rich merchandise.

Not all sorts of *rassade* are good for the coasts of Africa. In Angola, particularly at Loango de Boire and at Malimdo and Cabindo, one needs little other than black and white-and-black. The latter is called *Contre-Brodé*. The black is sold, or rather exchanged, by the *masse* weighing three and a half pounds. The *contre-brodé* also by *masse*, but not by weight. Each *masse* contains a certain number of strands.

In a cargo to trade 612 Negroes, principally between the Seffre and Andres rivers, one needs about 3,000 pounds of rassade, that is, 1,200 pounds of *contre-brodé*, 800 pounds of black *rassade*, and 1,000 pounds of all the other colors. See VERROTERIE.

VERROTERIE (tome 2, column 1936). These are small glassworks that serve in the Commerce that Europeans conduct in several places on the Coasts of Africa, as well as in the Islands and the continent of America.

This *Verroterie*, also called *Rassade* or *Razade*, consists of various glass grains in all colors and diverse sizes, pierced in the middle in order to string them, and to make necklaces, bracelets, ear pendants, and other ornaments that the inhabitants and especially the women of these countries like for adorning themselves.

This merchandise, among other places, is good for Senegal and the coasts of Guinea, and the kingdom of Congo, from Cape Vert to the Cape of Good Hope. Large quantities were formerly distributed in the Isle of Madagascar, when the French had establishments there. It is still one of the things appreciated by the peoples of New France, particularly those discovered beyond the Lakes and along the banks of the great Mississippi River. The glass used to make this *verroterie* takes its color during the fusion itself of the vitrified materials, by mixing diverse elements according to the desired color. Iron rust alone produces red; red copper and calcined cobalt produce blue; for green one needs calcined copper, iron rust, or *minium*; and for violet, cobalt and magnesium.

The different sorts of *Verroterie* and *Verrots* that are good for Natives of America or Blacks of Africa are:

Large and small red *Ambréades*
Large and small *Comptes de lait*
Large and small fine Crystals
Red *Galet* and others striped
Striped grains
Margriètes in diverse colors
Citron *Olivettes*, and others white
Yellow *Pesant*, and green *Pesant*
Citron *Rassade*

Of the four sorts of *Verrots*, that is red, yellow, black, white and mixed colors, there are two kinds, that is, large and small.

Finally, *Contre-Brodé*, not yellow and red. See RASSADE.

APPENDIX B. TRANSLATION OF "HOW TO MAKE *ROCAILLE*" BY JEAN HAUDICQUER DE BLANCOURT (1718 [1697], II:132)

All our mercers sell this *Rocaille*, which are yellow and green grains of which rosary strings are made for sale to country people. Most of this kind of merchandise is carried to the Indies, Africa, and the Islands [of America], with which the peoples of these countries adorn themselves, wearing them around the neck in scarves, as bracelets, and around the waist.

Enamel and glass painters use a lot of this kind of *Rocaille*, although of poor quality that has impure lead, as we have said elsewhere. They do so to avoid making a good flux, making do with the clearest *Rocaille*, the most transparent and having the least lead in it. This apparent quality does not make it better, unless there is less lead; in any case, the lead is always impure, having undergone no purification.

We have counselled enamel workers, and we must do so here again, to take instead of this *Rocaille*, our crystal material made with glorified Saturne (*see* Chapter CXII) or other similar materials as we have taught, which have perfect purity. However, to satisfy everyone, we will give the composition of *Rocaille*, which is very easy.

To make the yellow, take one pound of very fine, very white sand, with three pounds of lead; grind these together in the mortar, and put it all in a strong crucible, covered and well-luted. Once the luting is dry, place the crucible in the glassworker's furnace, or in an aerated furnace which produces intense heat in order to reduce this material to glass, as is done with lead glass (Chapter LXXXII), and your *Rocaille* material is made. You put it in grains, or any other shape you desire.

To make green *Rocaille*, one needs the contrary of the yellow. Put three pounds of fine sand with one pound of lead, and it will be harder. This material changes color during fusion, becoming pale red. That is how to make the *Rocaille* used by most workers, and one sees there is no preparation of lead that makes the *Rocaille* full of impurities.

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ENDNOTES

1. Turgeon (2001:66) translates *canons* as rods, however the l'Association des Verriers au Chalumeau de France (2018:16) uses *flûte* and *canon* as synonyms for glass tube.

2. A *masse* was 3.5 French pounds (1.6 kg), or could signify a certain number of bead strings (Savary de Bruslons 1723, II:1936).

3. Girancourt (1867:7, 11) pinpointed its location on a street connected to that called Bonne-Nouvelle, later known as the rue de la Verrerie.

4. Turgeon (2001:66) considered enamel to be the frit core itself.

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BEADED APRONS OF THE COASTAL PEOPLES OF THE GUIANAS

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Although many beaded aprons from the coastal area of the Guianas are among the oldest preserved collected objects of the South American lowlands, there is still no general consensus as to who the manufacturers of these aprons were. The glass beads used differ from those typically employed at the end of the 19th century and can be dated between 1750 and 1850. In the literature and museums, these aprons are not frequently described in detail, and the author is not aware of any early object for which a collector has provided more detailed information. This article is intended to give an overview of the aprons collected in early times and now found in museum collections, examining their patterns and bead materials, and reconstructing their origins with the help of literary sources from the 16th to 20th centuries.

INTRODUCTION

In the middle of the 17th century, women in northern South America began producing an item of clothing that was both functional and decorative: the glass-beaded trapezoidal apron known as the *queyu*. This term comes from the Arawak language; the Carib-speaking Akawaio and Pemón also used the term *mosa* or *motsa*. These aprons were the women's only piece of clothing, their use possibly prompted by the arrival of Europeans. An indication of this is that the Spanish word *camisa* (shirt) was astonishingly used in the Guianas for the finely handwoven cotton aprons of the men (Gillin 1948:835; Koch-Grünberg 1923:31). The British navigator and explorer Sir Walter Raleigh (1751:194), on his travels in today's Venezuela, only met women who were "stark naked." Neither could other explorers of the 16th century suppress a slight shudder in their reports of so much shamelessness. Since there are no early reports about possible precursors of aprons using plant seeds instead of beads, the development remains speculative. While the aprons that originated in the interior of Guyana are often described in the literature, early works concerning the coastal peoples pay very little attention, and pieces are subsequently misclassified or even unclassified in many ethnological museums.

The Inhabitants and History of the Guiana Countries

In the early 17th century, English and Dutch trading companies settled on the Guyana coast and selectively established colonies there (Figure 1). The western region was inhabited by the Warao (Warrau) as well as Caribs and the Arawak. The most numerous were the Carib-speaking groups, also referred to as Galibi in sources, who called themselves the Kali'na. The Arawak lived closer to the coast than the Kali'na in western Guyana. When the Spaniards conquered the Caribbean islands in rapid succession after Columbus' arrival, part of the population of the Orinoco delta and coastal islands (especially Yao and Paragoto) fled, triggering extensive migration along the mainland coast (Carlin and Boven 2002:12; van den Bel 2015:648, 650). In the eastern part (later French Guiana), the Kali'na and Yao finally became the dominant groups. In the 16th and 17th centuries, the Spanish, Portuguese, British, Dutch, and French fought bitterly for supremacy, relying on shifting indigenous allies. In 1677, the French were able to establish themselves permanently in Cayenne (van den Bel 2015:649), and after centuries of conflict, the Dutch colonies of Essequibo, Berbice, and Demerara changed hands once again in 1815, before being united as British Guiana in 1831. Only Surinam, with the exception of its early years, remained under Dutch administration until independence in 1975.

Aprons: The Initial Observation

Already in 1652, the Jesuit priest Antoine Biet observed the first beaded aprons among the female inhabitants of the island Cayenne. He describes the women of the "savages" of Cayenne: "*Les femmes vont nues comme les hommes, portant devant leur nature un camisa large de deux mains, tissu de grains de verre ou rassade*" (The women go naked like the men, carrying in front of their nature a *camisa* two hands wide, a fabric of grains of glass or beads) (Biet

Figure 1. The Guianas during the second half of the 18th century showing the location of the tribal groups (in red) discussed in the text (drawing: David Weisel).

1664:353). The young girls, unlike the adult women, did not wear aprons. Biet mentions the blue and red body painting and the piercing of ears and lips to accommodate gemstone jewelry. Bundles of up to 20 strings of glass beads were wrapped around arms and legs, as well as chains of bone rings or seashells. The women also wore jewelry made of green jade-like stones imported from the Amazon, to which they attributed a healing effect against epilepsy and bleeding. Particularly appreciated were crystals that the women wove into their hair. It is very probable that the descriptions refer to the Galibi, whom the French in French Guiana called the Caribs or Kali'na.

Biet was part of a group of French settlers who brought the first black slaves with them. Like others before them, their attempt to settle failed due to disease and the attacks of the locals. The survivors of the expedition were forced to retreat to the island of Barbados.

THE WESTERN GUIANA COUNTRIES AND THE ARAWAK

Early Mentions in the Literature

Aprons were also made on the western coast of Guyana. They first appear in the report of the Dutch government official Adriaan van Berkel who, in 1671, visited Fort Nassau, the capital of the Berbice colony, writing of the Arawak (or Lokono, as they called themselves) who lived there:

> From both sides under the arms, after the manner of bandoliers, they sling all kinds of [string] beads; the green and yellow ones are held in the highest esteem,... these bead ornaments are also wound around their arms in three places; to wit, on the

> wrists, above the elbows, and on the shoulders. A lap, artfully made of the same beads, covers their modesty. Below the knee one sees similar adornments (van den Bel, Hulsman, and Wagenaar 2014:88).

He thus describes not only aprons but also other extensive women's adornments. Further brief hints of the aprons of the Arawak can still be found in the 18th century in the writings of the British physician Edward Bancroft (1769:273) in the year 1766 and the Dutch physician Philip Fermin (1770:42ff.) in the year 1770. Surinam plantation owner Johannis Sneebeling from the 1770s also provides descriptions of aprons (Kloos 1973:6), which were considered interesting by van den Bel (2015:655) because they probably referred to the Paragoto.

All observers deal only with patterns in general. One exception is the author Aphra Behn who visited the then-English colony of Surinam, most probably in 1663-1664, and described flowers as patterns in her novella, *Oroonoko or the Royal Slave*:

> The beads they weave into Aprons about a quarter of an Ell [29 cm] long, and of the same breadth; working them very prettely in Flowers of several colours of beads; which Apron they wear just before'em, as Adam and Eve did the Fig-leaves; the men wearing a long strip of linen (Hughes 2007:125).

Further descriptions of body adornment and other details indicate more exact knowledge on the part of the author.

Christlieb Quandt, a German missionary of the Moravian Church who lived in the mission Hoop at the border river Corentijn in Surinam from 1769, reported ethnographically in greater detail about the members of different ethnic groups living there:

> The apron of the Arawackian women has the size of a large quarto leaf [23-26 cm], and is made of coral [beads]. The background is either white, yellow, red or blue, into which some flowers are knitted, which the women know how to make very skilfully, but on which they often spend a lot of time.... [Figure 2] The Warao have larger aprons, the size of a small sheet of paper, mostly of white corals larger than those used by the Arawacks. But such aprons are rare for them, because they are poorer than the Arawacks (Quandt 1807:244-245).

The Warao (Warrau, Guarauno) spoke an isolated language and lived in the coastal area of British Guiana and Surinam in the lower, swampy areas. Above all, Quandt clearly distinguishes the Arawak from the Caribs (Kali'na):

> The Carib women do not wear aprons of corals, but use the above-mentioned blue East Indian calico, called Salpuris, to make themselves a garment that is somewhat similar to the European leg garments; only they are much shorter, and hardly cover half the thigh (Quandt 1807:246) (Figure 3).

The lovely glass beadwork attracted the attention of Europeans quite early and they began to collect it, leading at times to bizarre encounters. In Berbice in 1797, the military doctor George Pinckard (1816:517) tells of a young girl who took off her apron, which he wanted to add to his collection, "without blushing" directly in front of his eyes and replaced it with a handkerchief which he handed to her. The illustration "*Een indiansse vrouw van de stam der Arowakken*" (An Indian woman of the Arawak tribe) also dates from this period. This was made between 1772 and 1777 and can be found in the book, *Reise naar Surinamen*, by the Scottish-Dutch officer John Gabriel Stedman; the reproduction of the apron, however, is not very realistic (Stedman, Gabriel, and van Lier 1974: Plate XXXIV). The same applies to the apron that he depicts among everyday Indian objects in his second work, *Narrative of a Five-Year Expedition* (Stedman 1796:406).

Very vivid are depictions of Arawak women with beaded aprons from the 19th century. In a diorama that can be seen today in the Museum Volkenkunde Leiden, Creole artist Gerrit Schouten shows an excerpt from the life of an Arawak group in 1827 (Figure 4). One of the women in the scene is busy making a beaded apron and all the women are wearing them. The frequently chosen lattice pattern and the triad of brownish-red, green, and yellow colors, typical for a common type of apron, can also be seen. For her work, the woman uses a board-like instrument, in contrast to the peoples in the interior who used a variation of a bow-loom. A colored lithograph from 1850, based on the drawing "Arawakken" by Théodore Bray, shows a woman with an apron patterned with floral rosettes (Figure 5).

Apron Patterns

Christlieb Quandt was a Protestant missionary whose principles were very different from those of the Catholic Jesuits in French Guiana and almost diametrically opposed to those of the Spanish conquerors. For the Spaniards, the Caribs in particular were cannibals condemned to Hell, who had to be killed or enslaved if they were not baptized. In contrast, the Moravian Brethren (who, of course, were also active a hundred years later) had respect for the ideas and idiosyncrasies of the native Arawak so that they did

Figure 2. Lokono apron, 38x14 cm, Surinam, 18th century, most likely collected by Christlieb Quandt (courtesy: Staatliche Kunstsammlung, Dresden / Völkerkundemuseum, Herrnhut, acc. no. 66831; photo: Eva Winkler).

not censure their very sparse "clothing" from the outset. These Moravians placed the life of Jesus at the center of their missionary activity, which was based on pietistic principles. This could have indirectly provided the inspiration for the depictions on an unusual and perhaps unique apron (Figure 6) in the Museum Fünf Kontinente, Munich, which was acquired in 1857 from the old inventory of the University of Erlangen (acc. no. Erl-172). It shows an idiosyncratic composition of two large, naturalistically depicted white birds with red and blue drops hanging from their beaks, standing on church buildings, as well as stylized pomegranates, grapes, and other objects that are difficult to identify. The bottom of the apron is adorned with a border depiction of the same form as found on 18th-century Turkish carpets. Two naturalistically depicted rabbits are situated at the upper edge of the apron. The two birds are a simplified version of a motif known from heraldry, but which in Christian iconography also serves as a symbol for Jesus Christ: the pelican tears open its chest in order to bring its dead young back to life with its blood. The rabbits represent the resurrection of Christ, while the pomegranates and grapes represent immortality and Christ's connection with the faithful. It can be assumed that the motifs were copied from a template.

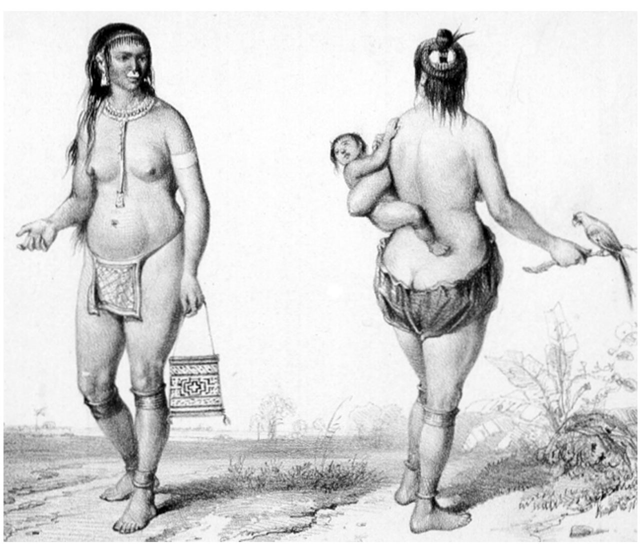

Figure 3. Representation of an Arawak woman (left) and a Carib woman (right). "*Femmes Indiennes*" by Pierre Jacques Benoît (1839: Figure 75).

Figure 4. Making an apron, in a diorama by Gerrit Schouten, 1827 (courtesy: Museum Volkenkunde, Leiden, acc. no. RV-360-5139d).

Figure 5. "Arawakken" (Bray 1850: Plate 23) (courtesy: Tropenmuseum, Amsterdam, acc. no. TM-3444-17).

Some aprons in Dutch museums probably also originated in this early period. Two pieces from the Tropenmuseum in Amsterdam are very archaic, showing stylized animal figures in addition to equally stylized floral rosettes (Figure 7) (acc. nos. TM-2118-23, TM-A-6131a). Contemporary reports relate that groups of natives visited the coastal settlements, inspiring women to design new patterns (Kirke 1898:48f.; Wood 1870:622). When such aprons are adorned with peacocks, fruit bowls, and floral palmettes, they call to the Western mind images from the Far East (Musée cantonal d'archéologie et d'histoire Lausanne, acc. no. I. D. 376; Musée du quai Branly, acc. no. 71.1878.32.113). The oft-described "blossoms" are also more reminiscent of the woven knots and depictions of blossoms on oriental carpets or fabrics than of realistic flowers (Figure 8, left) (Völkerkundemuseum, Herrnhut, acc. no. 66831). The ethnologist Claudia Schmitz (2016:241) suspects European needlework as a model and many of the motifs can be found on Dutch needlework samplers of the 18th century in exactly the same style; e.g., ships, peacocks, fruit baskets, and stylized animals. It is also likely that patterns that take up lattice forms as a design principle and are found in large numbers in museum collections were inspired by fabrics (Figure 8, top) (Herrnhut, acc. no. 66832). Apparently foreign influences were readily taken up by the women and translated into their own representations (Figure 9; *see* inside back cover for detail).

This prompted Schmitz (2016:242) to speculate that the aprons could have been "possibly made especially to European taste and for sale to Europeans" since the traditional patterns on wickerwork, for example, are often meandering. In that old pieces with traditional patterns

Figure 6. Lokono apron, 57x30 cm, Surinam or British Guiana, probably 18th century (courtesy: Museum Fünf Kontinente, Munich, acc. no. Erl-172; photo: Nicolai Kästner).

Figure 7. Lokono apron, 39x22 cm, Surinam, probably 18th century (courtesy: Tropenmuseum, Amsterdam, acc. no. TM-A-6131a).

are an absolute exception in the collections and are not sufficiently documented, this assumption cannot be verified. The statements of missionaries and other eyewitnesses on the patterns they observed also point in a different direction. Moreover, in the 18th century, hardly enough Europeans would have visited the remote mission stations in order to

Figure 8. Display of aprons most likely collected by Christlieb Quandt (courtesy Staatliche Kunstsammlungen, Dresden/ Völkerkundemuseum, Herrnhut; photo: Johanna Funke).

Figure 9. Depiction of a sailing ship on a Lokono apron, 45x29 cm, Surinam or British Guiana, probably 18th century, private collection (photo: author).

stimulate such production. Only the aprons produced during the late 19th and early 20th centuries in the interior and those from French Guiana show meandering or wickerwork patterns.

Also in the 19th century, various authors such as the colonial official Henry Bolingbroke (1807:153) reported on the aprons of Arawak women, and the German baron Albert von Sack (1821:68) even observed young girls producing them. He relates that two young girls worked together and that when one of them had finished threading glass beads onto the wefts, handed them over to the other for incorporation into the apron, which is a necessity in this technique. In the second half of the 19th century, the aprons finally became a rarity, of which there are no photographic documents. Nevertheless, the German globetrotter and ethnologist Wilhelm Joest (1883:81) wrote of the "much more beautiful beaded aprons" of the Arawak, which were no longer preserved everywhere in Surinam, but only in Demerara. Officer Theodoor van Lelyveld (1919:24f.), stationed in Surinam from 1894 to 1898, said of the Arawak women that many who had not yet converted to Catholicism continued to wear their "Kwejoe" of beads, together with a cotton shirt.

Apron Collections

Various documented pieces from the late 18th century are in the holdings of the Moravian Mission, making comparisons with other, poorly documented pieces possible. Quandt brought with him an ethnographic collection that was registered in 1780 in the *Catalogus der Kunstsachen* of the Brethren Unity in Barby, Saxony-Anhalt, Germany (Nippa 2003:123). A precise tracing of individual objects is scarcely possible, however, because the archives were long neglected in the past. Further specimens originated from the estate of Bernard Kinne, a grandson of missionary Christlieb Quandt, and were also most likely collected on site by the latter between 1769 and 1780 (Figure 9, bottom) (acc. nos. 66832, 66788, 66789).

An apron collected (but not categorized) before 1839 by the German researcher Robert Schomburgk, who was in

British service, is also suitable for dating purposes (Figure 10) (Cuming Museum, London, acc. no. C09493). It is very similar to several objects in Dutch museums, which probably house the largest number of Arawak aprons (Tropenmuseum, Amsterdam, acc. nos. TM-A-6131n, TM-1310-2; Museum Volkenkunde, Leiden, acc. nos. RV-1354-84, RV-2399-41). Unfortunately, the documentation of the oldest objects there only dates back to the 1880s. These pieces, which originate from the first third of the 19th century according to the glass beads used (e.g., red green hearts), are, however, clearly designated as "Arawak" and classified according to their collectors (Museum Volkenkunde, Leiden, acc. nos. RV-370-405, RV-370-406).

A large number of Arawak aprons can also be found in German ethnological museums, some of which come from the historical art chambers and curiosity cabinets of European aristocratic houses (Herzog Anton Ulrich Museum, Braunschweig, acc. no. Ame9; Weltkulturenmuseum, Frankfurt am Main, acc. no. 04050; Museum Fünf Kontinente, Munich, acc. nos. Hg-1046a, Hg-1046b; Niedersächsisches Landesmuseum, Hanover, acc. nos. 59, 352; GRASSI-Museum, Leipzig; acc. no. SAm650). The Pitt Rivers Museum in Oxford holds a specimen with a green background and stylized flower pattern, which was collected in 1812 by British Lieutenant Westwood in the Essequibo district and has the earliest documented collection date. A second specimen collected by Westwood, unfinished at the time of collection, exhibits diamonds on a green background (acc. nos. 1886.1.938, 1886.1.939). Further green-colored specimens in various European museums could be related to these pieces. Most of the aprons show simple patterns, are small to medium in size, and are rather roughly worked.

FRENCH GUIANA AND THE APRONS OF THE KALI'NA

References in Literature of the 17th and 18th Centuries

The situation in French Guiana differed considerably. There were Jesuits like Antoine Biet, mentioned previously, who first reported the wearing of beaded aprons by the Galibi. A few decades after Biet, the Jesuit Father Jean de la Mousse prepared the way for the foundation of the missions in Sinnamary and Kourou, both located near the coast to the west of Cayenne. Near Cayenne he came into contact with members of the "Arouages" and "Pariotes," whose *Capitaine* spoke Galibi and told him about his experiences on the coast between the Amazon and Orinoco rivers. Such encounters reveal the amazing mobility of many of the local tribes who were not nomads in the true sense of the word. In the town of Tullery, where De la Mousse founded a short-lived mission probably in 1686, he witnessed a large dance festival attended by many members of the Sinnamary people. He describes these without mentioning their ethnicity:

> *Les femmes outre les grandes tabliers de rassades ou de petite okayes qui vont jusqu'aux genoux, ont la nuque du col rehaussé d'un demi-pied par le grand nombre de tours de rassade et de petite okaye qui pendant sur la poitrine* [Besides the large aprons of glass beads or small *okayes* [snail-shell beads] which go up to the knees, the women have the nape of the neck raised half a foot by the large number of turns of glass beads and small *okaye* which hang on the chest] (Collomb 2006:193).

Figure 10. Lokono apron collected by Robert Schomburgk before 1839, British Guiana, (courtesy: Cuming Museum, London, acc. no. C09493; photo: Andreas Schlothauer).

De la Mousse and other authors do not always make it clear whether they also used the term "Galibi" as a collective term for other indigenous people, since different ethnic groups could be settled at the missions at the same time. For example, the mission in Kourou in 1714 consisted of 250 Kali'na, 30-40 Coussaris, about 30 Maraonnes, and 50-60 Arouas, as Father Aimé Lombard notes (Armanville 2012:27). The latter peoples no longer exist in French Guiana today, just as various other historical ethnonyms can only be assigned poorly or not at all. Many peoples merged into larger ones, such as the Kali'na and the Palikur.

An important witness is Jesuit Father Jean Chrétien who, in his 1725 "Letter from Cayenne," provides comparatively extensive ethnographic observations, especially on the Galibi. According to Chrétien, the women used an apron one square foot in size with a slightly longer lower edge. On festive occasions, they would often wear larger aprons, reaching down to their knees. These were made of glass beads, with larger beads at the lower edge to keep the apron balanced. In addition to the Galibi, he also mentions other ethnic groups such as the Palikur (Chrétien 1957:50).

The earliest illustration of a trapezoidal beaded apron can be found in the book of the French physician Pierre Barrère (1743:194), *Nouvelle relation de la France equinoxiale*. Unfortunately, the apron (Figure 11, left) does not show a pattern, but Barrère (1743:122) describes another glass bead apron in more detail: "*Le femmes se servent d'un coyou, ou tablier presque triangulaire, tissu de Rassade, ou de grains de cristal; & large, en bas, de près d'un pied*" (The women use a *coyou*, or almost triangular apron, a fabric of *Rassade*, or grains of crystal; & wide, at the bottom, close to one foot). "*On y voit les plus beaux compartimens du monde; & la plus fine Rassade n'y est pas épargnée*" (One sees there the most beautiful *compartimens* of the world; & the finest *Rassade* is not spared) (Barrère 1743:194). This description does not, however, make an interpretation any easier since the word *compartimens* can at best be freely translated as "pattern."

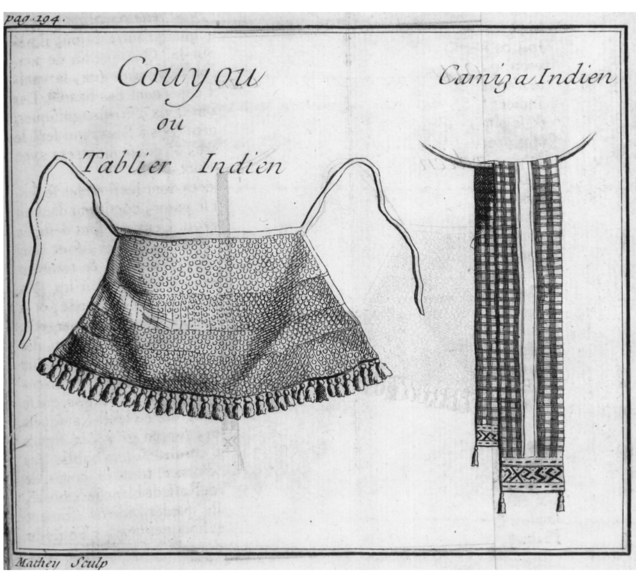

Figure 11. Indian *couyou* or apron (Barrère 1743:194, Plate 1).

There is also a depiction of an Indian couple in which the woman is wearing an apron (Barrère 1743:122). Small aprons reaching to the knees were worn in everyday life and larger aprons on festive occasions (Barrère 1743:194). Barrère stayed in the coastal area of French Guiana from 1722 to 1727, and describes the customs of the "main nation" of the Galibi (Barrère 1743:121). He also lists several other indigenous peoples along the many rivers and mentions that the missions brought together members of different peoples (Barrère 1743:235ff., 1751:16). He mentions the preference of all tribes for beads of white and blue (Barrère 1743:194). Women who could not afford beads decorated their couyou with seeds of the fruit of the Abouai tree (Barrère 1743:196). Barrère emphasises that the women of the Galibi and the Palikur, an Arawak-speaking people in eastern French Guiana, did not put on the "Cuyu" until after their unpleasant initiation rites and thus shortly before marriage (Barrère 1743:225, 226). Already in 1736, Jesuit Father Elzéar Fauque, the founder of the Palikur mission on the Oyapock River, had expressed himself negatively about the approximately one-foot-square apron made of small glass beads as the only clothing of the Palikur:

> *Elles ne portent que jusqu'au temps de leur mariage un espèce de tablier d'environ un pied en carré, fait d'un tissu de petits grains de verre, qu'on nomme rassade. Je ne sache point que dans tout ce continent il y ait aucune nation ou regne une pareille indécence* [They only wear, until the time of their marriage, a kind of apron about a foot square, made of a fabric of small grains of glass, which is called *rassade*. I do not know that across this continent there is another nation or kingdom of such indecency] (Fauque 1819:479).

Fauque's statement that the apron was put on only before marriage contradicts the observations of both Barrère and Biet. In this context the German-Brazilian ethnologist Curt Unkel (whose Indian name was Nimuendajú) wrote that the Palikur women had long since exchanged "the bead apron, which P. Fauque was still horrified about in 1736, for European costume" (Nimuendajú 1926:62).

Authors such as Dominican Father Jean-Baptiste Labat (1731:359), geographer Jacques-Nicolas Bellin (1763:229), Charter and Request Master of the Amsterdam Admiralty Jan Jacob Hartsinck (1770:6), and others used the travel stories of third parties or material from public archives and therefore did not create any reports from their own experience.

In French Guiana – in complete contrast to the western Guyana coast – the women of the Caribs, as well as the Palikur, wore beaded aprons, whereas there are no eyewitness accounts of the Arawak living there. The trade that began not long after the discovery of the country, especially with Dutch merchants, had made glass beads generally available on the coast as early as 1680. Certainly a short time later other peoples in French Guiana also possessed this adornment, as noted in the report of Claude Tony. During an expedition in 1769, he accompanied French botanist and explorer Jean-Baptiste Patris, who was searching for minerals, to the hinterland of the Oyapock River. About 250 km from the coast, they met "Calcuchéen" – the Carib-speaking Kaikushiana (Carlin et al. 2014:27) – on the upper reaches of the Camopi River, whose women wore beaded aprons: "Et les femmes n'ont qu'un couyon de rassades pour cacher leur nudité" [And the women have only a *couyon* of *rassades* to hide their nakedness] (Tony 1835:280, 1843:217). Direct neighbors were the "Arramichaux" or Aramis(h)o (Lombard 1928:124), a subgroup of the Tiriyo in which the women wore the *couyou*: "Ils sont nus aussi, les hommes n'ayant qu'un calimbé et les femmes un couyou" [They are naked too, the men having only a *calimbé* and the women a *couyou* (Tony 1843:218).[1] A little later they came across Wayana who lived in a kind of war camp and whose women still did not use any clothes, as opposed to later, in the second half of the 19th century.

Apron Patterns

Beaded aprons already existed before the beginning of the missions and aroused the displeasure of the Jesuit missionaries in French Guiana. This may have contributed to the fact that the patterns did not absorb European influences. The baskets and presentation plates woven by the men of many groups were the model for the meandering patterns. What initially prompts the Western observer to automatically think of the Greek borders of antiquity is in reality of indigenous origin (Figure 12). Usually there are one or two meandering bands, but now and then they also cover the entire surface. In this they correspond to many later aprons of the interior which, however, deviate stylistically and in the unadorned fringes of the lower edge. It must remain speculative as to the extent to which the Wayana and Tiriyo in the interior of Surinam and French Guiana were directly influenced by the Kali'na, whose aprons were very similar in their production and design with meandering bands.

Aprons in Museums

After the abolition of the Jesuit mission in French Guiana in 1763, the Kali'na, already decimated by diseases, were without protection from the French settlers and the Maroons – the escaped slaves from Surinam – and retreated to more inaccessible areas. The country was ruled by anarchy for decades, even falling temporarily to the Portuguese from 1809 to 1817, during the Napoleonic wars. The number of Kali'na remaining in the country fell to a very low level and around 1840 it was estimated that only 250 individuals remained; the Palikur numbered 220 (Grenand 1979:363). It can be assumed that only a few aprons were produced. It is also hard to imagine that baptized women wore these scanty garments during the time of the mission stations. Thus, preserved aprons from French Guiana are true rarities. They are mainly found in the Musée du quai Branly in Paris. Of 15 specimens,[2] 11 are classified as belonging to the Kali'na and called *Couyou/Couiou* (Roux 2012:43). Two are not attributed to any ethnic group, and one to the Warao. Aprons of the Palikur ("Cuyu" after Barrère) or Kaikushiana do not seem to have survived, or at least cannot be identified. The complicated history of the collection is described by Benoît Roux in his essay *Les collections royales d'Amérique du sud*. In the 18th century, the sometimes quite precise information of the collectors was often not passed on, which is why the original collections were ethnographically insufficiently documented. Further information was lost during the items' progress through various museums (Roux 2012:13f.) The apron with accession number 71.1909.19.129Am(D) of the Musée du quai Branly represents an example that can be at least partially traced (Figure 13). It was moved from the old collection of the "Ècole de Santé de Brest" in about 1830 to the collection of the Musée d'Archéologie nationale, then to the Musée de Marine (acc. no. 1872-2898), and finally to the Musée du quai Branly where it now resides.

The majority of the collection of the Musée du quai Branly consists of aprons with collection numbers beginning with the digits 71.1878.32 and mostly from the old collection of the Dépôt de la Bibliothèque nationale (Muséum des Antiques). According to Benoît Roux (2012:4), all these objects were "pre-revolutionary," having entered collections before 1789, and have their origin in French Guiana (Figure 14). Nevertheless, in the list of ethnological objects collected by Dutch governor Wilhelm V, Prince of Orange, which were confiscated in 1795 in Holland, for example, one also finds "*Deux tabliers de femmes sauvages, d'un tissu particulier orné de verroterie*" (Two aprons of heathen women, of a particular fabric adorned with glassware) for which ethnic origin, place of collection, and whereabouts are unclear (Roux 2012:40).

Figure 12. Kali'na apron, 61x36 cm, French Guiana, probably 18th century, private collection (photo: author)

Four aprons in the collection of the Musée du quai Branly show the typical figurative Arawak style: depictions of flowers and peacocks. According to documents in the Bibliothèque nationale, two of them were collected in French Guiana (Roux 2012:47) and are classified as Kali'na (acc. nos. 71.1878.32.93, 71.1878.32.113). Another is attributed to the Warao (acc. no. 71.1881.107.3), and a fourth is not categorized at all (acc. no. 71.1957.0.6 X Am). The alleged "Warao" object (acc. no. 71.1881.107.3) also contains red white-heart beads in addition to the brown-red ones, so it was produced after 1830 and seems to be of a different origin.

Two unattributed specimens in the Kali'na style are owned by the Musée des Beaux Arts et d'Archéologie, Besançon (acc. no. 853.50.70, collected before 1853) (Figure 15), and the Musée d'Histoire Naturelle de Lille (acc. no. 990.02.3301) (Figure 16), obtained before 1849 by Alphonse Moillet. It is, however, uncertain whether he acquired the apron while traveling locally or not.

THE BEADS

The glass beads used as the main material for the design of the aprons provide valuable information about their origin and age. In addition to knives and axes, glass beads became an important commodity from the beginning of contact with Europeans. In 1671, Van Berkel reported on the preference among the Arawak along the western coast for yellow and green beads (van den Bel 2014:88). Cargo manifests and letters from the 17th century mention glass beads as part of ship cargoes bound for the New World, partly with exact quantities (Hulsman 2009:91). In 1642, the ship *Argus* loaded a total of 410 pounds of glass beads for Essequibo in the colors white, yellow, green, and violet (Hulsman 2009:337). The commander of Berbice, Mathaeus Bergenaer, ordered 300 pounds of white, blue, and green beads for his colony in 1668, and 400 pounds in 1669 (Hulsman 2009:339). In a letter to the West India Company in 1679, the governor of Essequibo, Abraham Beekman, requested a larger quantity of sky-blue beads for trade in his colony and with the Spaniards (Hulsman 2009:187; Odeen 2001:194).

The trade in glass beads on the eastern coast of Guyana is also documented, particularly in Dutch archives. The shiploads contained small, monochrome glass beads in quantities up to several hundred pounds, while the larger decorated beads were counted individually up to a thousand pieces (Hulsman 2009:336ff.). A total of several hundred kilos were imported annually, some of which were probably

Figure 13. Kali'na apron, 40x23 cm, French Guiana, probably 18th century (courtesy: Musée du quai Branly, acc. no. 71.1909.19.129Am[D]).

Figure 14. Kali'na apron, 40x21 cm, French Guiana, 18th century (courtesy: Musée du quai Branly, acc. no.71.1878.32.115).

Figure 15. Kali'na apron, 50x24 cm, French Guiana, probably 18th century (courtesy: Musée d'Histoire Naturelle de Lille, acc. no. 990.02.3301; photo: Philip Bernhard).

traded inland (Hulsman 2009:218). Lodewijk Hulsman mentions various sources with information on colors and varieties. In 1639, Captain Cornelis IJsbrantsz van der Sluijs loaded various grades of small beads of different colors as well as larger red and blue beads for Cayenne in his ship *St. Jan* (Hulsman 2009:336). Abraham Gerbier, on the occasion of a survey in Amsterdam in 1660, noted that red glass beads were delivered to Cayenne and the Approuague for the barter trade (Hulsman 2009:186f.). The governor of Cayenne, Joseph-Antoine Le Fèbvre de La Barre, wrote that beads "*de la Rassade blanche, et non d'autre couleur*" (white *Rassade*, not other colors) were in high demand among the locals (La Barre 1666:52).

Figure 16. Kali'na apron, 45x22 cm, French Guiana, probably 18th century (courtesy: Musée des Beaux Arts et d'Archaeologie, Besançon, acc. no. 853.50.70).

This information is consistent with the results of excavations in French Guiana, during which white, blue, and red beads were found in graves (*see* Oehrl 2019). In the coastal area of the west, however, no glass beads came to light (Hulsman 2009:218), in contrast to the interior of British Guiana where larger quantities of beads were found in graves on the Rupununi River dating from the first half of the 19th century (Evans and Meggers 1960:314-319, 322).

The aprons that survive today were created between about 1750 and 1850. In addition to the usual dating by comparing the style with documented pieces, the types of glass beads used provide particular clues. Special indicators are the red beads. Many specimens exhibit brown-red beads with a dark inner layer (called green hearts), an indication of production at the beginning of the 19th century or earlier. After 1830, ruby-red beads with a white core (white hearts) newly produced by Venetian glassmakers and much more brilliant in color, slowly replaced the brown-red ones (Billeck 2008:49; Harter 1992:87). Sometimes both varieties were used side by side in one piece, for example in the Schomburgk apron collected before 1839.

Blue beads often have a gray tint typical of early blue beads, and yellow tones are not very bright. The Arawak's preference for the four colors blue, green, yellow, and red, which are used together, is particularly striking. The women usually used small seed beads, about 1.75x2.5 mm in size, oblate and fairly uniform, which are almost always opaque. Other aprons contain slightly larger, less-round glass beads.

In the Dutch colonies, the beads used in 18th-century aprons likely came from the Netherlands, a major exporter of the products of Bavaria and Bohemia. It is unlikely that they were made in Holland since beadmaking there ceased ca. 1698 (Karklins 2012:82). Furthermore, prior to that date, they only produced drawn beads (e.g., seed beads), not those made by furnace winding. It is also possible that some of the beads may have originated in Venice, a major bead producer for several centuries, or France (from Rouen or Nevers).

The aprons of the Kali'na are much more reserved in their colors and often have only one or two main colors against a white background.

Many of the preserved pieces are conspicuous by the large, elaborately produced glass beads that are used along the lower edge. In the 18th century, the Arawak mostly used the colorless, transparent, round to oval "gooseberry" beads with fine white stripes (Figure 17). The large beads, which appear almost pristine, form the decoration of the fringes at the lower end of the Kali'na bead apron in Figure 12 and are varieties that were in use in the 17th and 18th centuries (Figure 18). Amber-colored beads with eight pressed pentagonal facets have been found at North American archaeological sites dating to 1650-1833, but are most common from 1700-1760 (Karklins et al. 2016:25, Figure 13). Similar pentagonal-faceted beads in blue and colorless glass were also found during excavations by Enrico Fernandes at an urn cemetery at site A-15, Vila Velha, in Brazil. They could be dated to the first half of the 18th century (Billeck and Luze 2019:107-108). These

Figure 17. Gooseberry beads (detail of Figure 9) (photo: author).

Figure 18. Pentagonal-faceted and "rattlesnake" beads (detail of Figure 12) (photo: author).

beads were produced in eastern Bavaria, Upper Austria, and neighboring areas of southern Bohemia (Karklins 2019). The same also applies to the so-called "rattlesnake" beads used here; round beads with wavy yellow lines applied as a thin glaze to a black background. Although it is impossible to say without chemical analysis, the beads may well be made of Proterobas, an easily melted stone used to make beads exclusively in the Bavarian Fichtelgebirge until the early 18th century (Karklins et al. 2016).

Sometimes beads at the bottom end were omitted and only the warp threads were left as fringe, which were then supplemented by the Arawak with natural or red-dyed cotton yarn. In the products of the Kali'na of French Guiana, fringe was often decorated with large seeds and/or natural-colored cotton tassels. In aprons from the interior, which often resemble those of French Guiana in the depiction of meandering forms, the generally unadorned bottom fringe represents a simple distinguishing feature. In addition, the long cotton threads of the upper and lower edges, as well as the side finishes, are usually left alone and sometimes additionally decorated.

APRON PRODUCTION TECHNIQUES

The technique of the beaded aprons is unmistakable and is the same for all pieces. It is not related to the preserved early Taíno objects of the Caribbean islands, which were produced using the technique of "brick-stitch" or "one-bead netting," which are both from the large family of beadwork net stitches. The history of the origin of the Guyana technique is unclear. North American native loose-warp beadwork derives mainly from basketry techniques which have been performed by women for a long time. In the Guyana countries, however, it was the men who wove various types of baskets and presentation plates. Many of these objects show rectilinear patterns which can be described as fretwork or meander. Geometrically stylized representations of animals are also common. These patterns can also be found in a similar form on aprons. More likely is the derivation of the beaded apron from simple cotton fringe aprons which were still worn in the 20th century by the Carib-speaking Pémon in Venezuela, Brazil, Guyana, and Surinam. Richard Schomburgk (1847:402f.) saw women dressed in red painted fringe aprons among a Ye'kuana group ("Maiongkong") on the border between Guyana and Venezuela. It is not implausible that cotton fringes were connected as a warp with beads arranged on weft threads.

Cotton has been grown in Guyana for a long time; in Peru it goes back 5,000 years. Other fibers, such as those from the leaves of the Mauritius palm (*M. flexuosa*), were used to make hammocks, Kali'na and Arawak using different techniques (Nippa:127). From time to time literature mentions the use of "silkgrass," a pineapple fiber (*Bromeliaceae*), both for aprons and hammocks (for hammocks, *see* Barrère 1743:114, 115). The use of this fiber in aprons seems to have been limited to the Amazon region.

The weaving process on the South American bow-loom is described in detail by Orchard (1929:100-103, Figures 96-98). Walter Roth provides a very instructive diagram (Figure 19) but it is highly probable that the aprons of the Arawak and the Kali'na were not made on a bow-loom, as in the case of the inland ethnic groups, but on a board-like device. One such is shown in the hands of an Arawak woman in Gerrit Schouten's 1827 diorama (Figure 4). The Wayana in southern Surinam also had comparable frames until the 20th century. Photos taken by Claudius de Goeje in 1937 show these boards (Museum Volkenkunde Leiden, RV-A117-2-269, RV-A117-3-23). Here the two ends of the cotton thread bundles of the upper end are fastened in holes, and the lower ends are knotted at two projections. Sometimes the cotton threads are only fixed to the edges of the trapezoidal board. The weaving process then takes place on the upside-down object.

The basic material consists of hand-spun cotton thread which is s-spun in some cases and z-spun in others. The wefts are usually of doubled 1-ply (thin) thread, the single warps of thicker, 2-ply thread. The Arawak and Kali'na only used native-made fibers. A number of beads are strung on the doubled weft thread and the warps are pulled through the gap in the weft thread on either side of 2-3 (rarely one or four) beads. Edge and finishing techniques vary over time and by culture. Often the side finishes, as well as the upper edge, consist of several twined 2-ply warp threads.

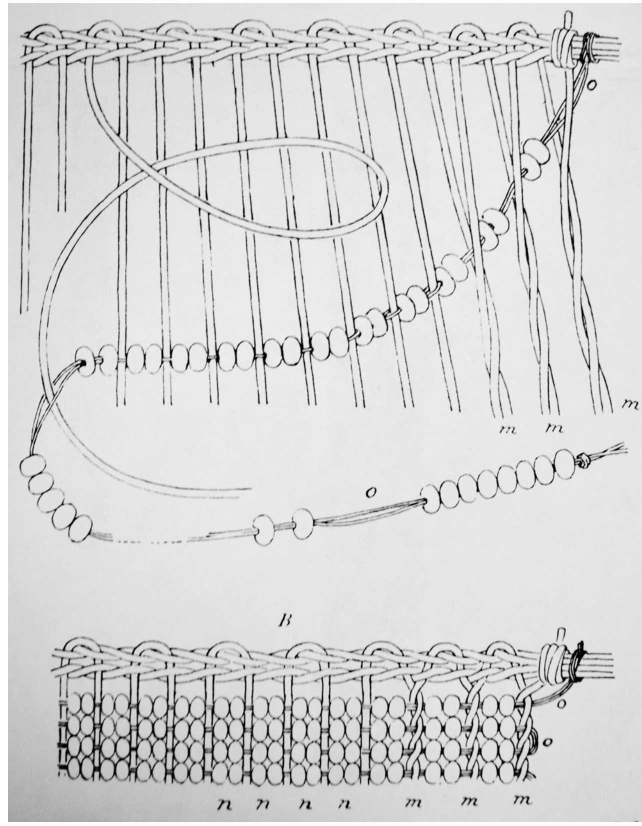

Figure 19. Apron weaving technique on a South American bow-loom (Roth 1924: Plate 18).

Sometimes several single strands at the upper edge are additionally wrapped with fine cotton. The aprons range from 10-70 cm in width (Wood 1870:621), but most are 20-45 cm wide.

CONCLUSION

It is clear from the preceding that the attribution of many early beaded aprons from the western Guiana countries to the Arawak/Lokono can be regarded as certain. The works of the Warao are described in a few sources only by their bead material, not by their patterns, and therefore remain in the dark. Among the Kali'na, only one instance of circumstantial proof is certain, since the women of the Palikur, Aramisho, Kaikushiana, and presumably also other peoples cannot be excluded as the manufacturers. There is no apron of this type with meandering stripes containing the red white-heart beads produced in Venice from about 1830, suggesting that their production was abandoned earlier. The aprons, which were widespread in the coastal areas of all Guiana countries for centuries, had become a thing of the past among the Arawak and the Kali'na, at least by the end of the 19th century. It was from this time that most of the better-known works of the interior came from ethnic groups such as the Makushi, Wapishana, and WaiWai. The already small indigenous population continued to decline in the coastal area and the rapidly changing society expected its members to be fully clothed.

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ENDNOTES

1. The narrative of Claude Tony has appeared in various compendia and the versions differ in content.
2. Accession numbers: 71.1878.32.93; 71.1878.32.94; 71.1878.32.95; 71.1878.32.96; 7.1878.32.97; 71.1878.32.98; 71.1878.32.99; 71.1878.32.113; 71.1878.32.114; 7.1878.32.115; 71.1881.107.3; 71.1909.19.129Am(D); 71.1934.33.35D; 71.1934.33.62D; 71.1957.0.6XAm.

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

Emma Derry

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

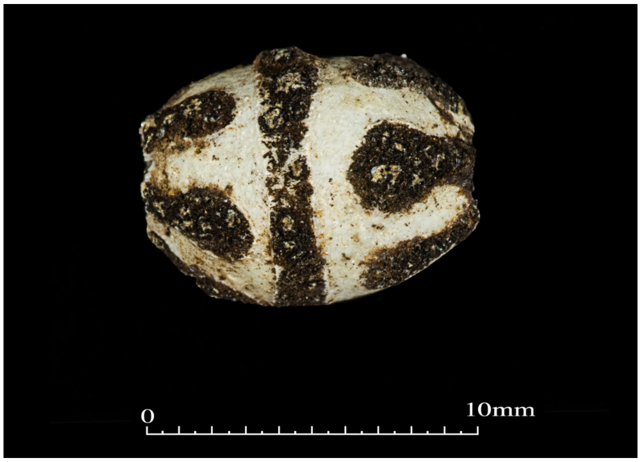

Figure 1. Variety 4A frit-core bead (all photos by Charles Durfor).

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.

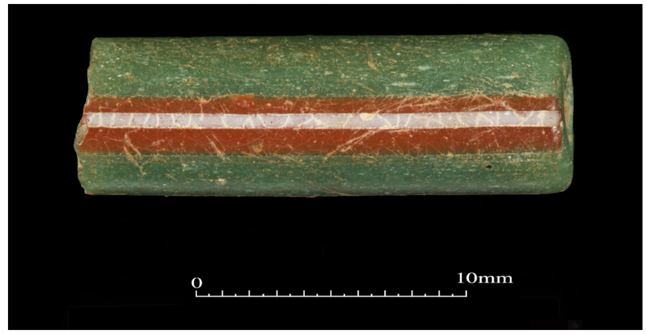

Figure 2. Ibb* bead with white-on-redwood stripes.

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.

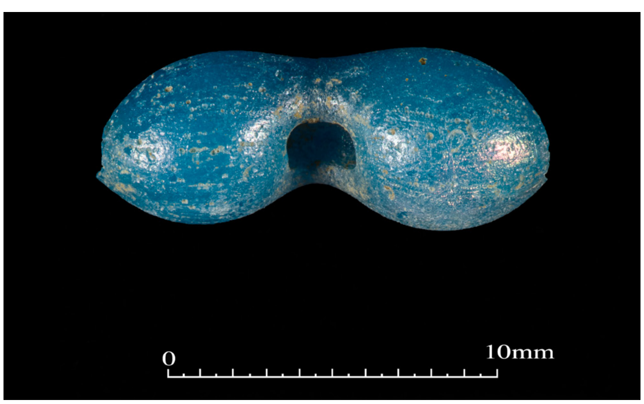

Figure 3. Fused IIa40 beads showing evidence of *a speo* heat rounding.

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).

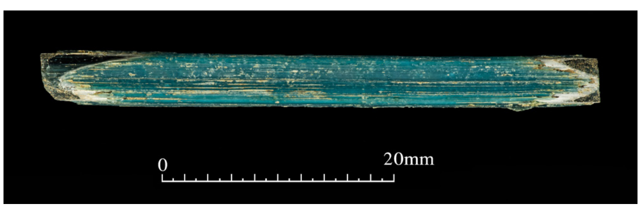

Figure 5. Long turquoise Nueva Cadiz (IIIc1) bead.

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%.

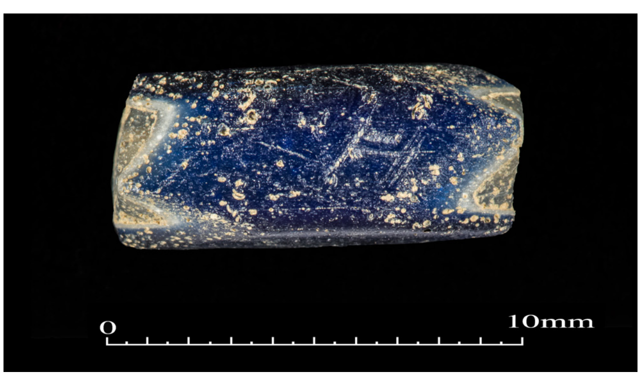

Figure 6. Navy blue Nueva Cadiz (IIIc3) bead.

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).

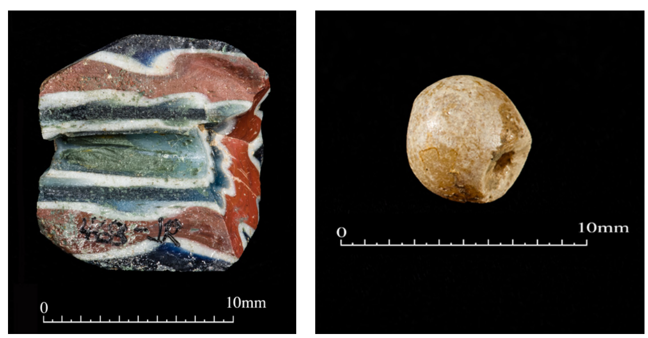

Figure 7. Left: Broken chevron (IIIm1) bead. Right: Wound truncated teardrop (WI*).

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).

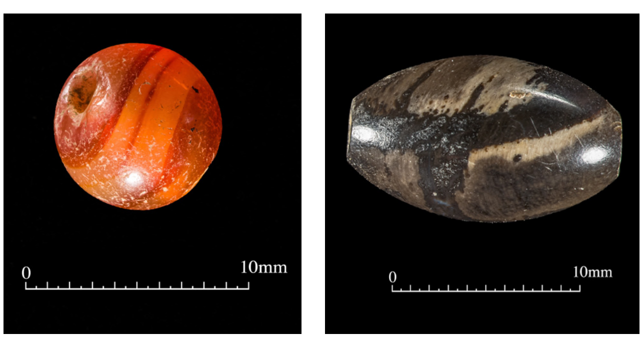

Figure 10. Left: faceted carnelian bead; Right: Black agate bead.

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

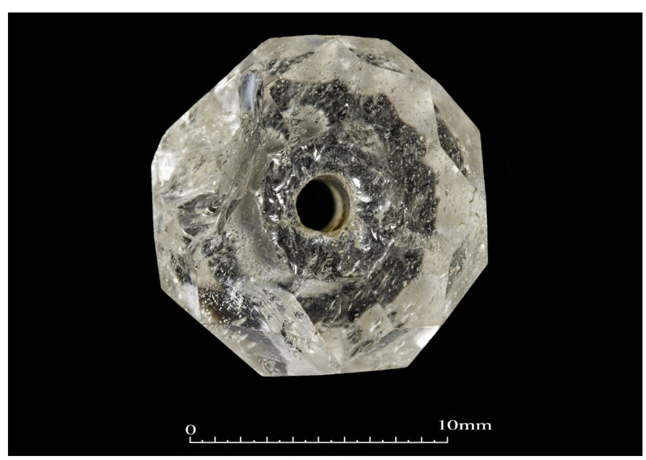

Figure 11. Cut-crystal bead.

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.

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ROMAN TO ISLAMIC BEADS AND PENDANTS FROM MATMAR AND MOSTAGEDDA, MIDDLE EGYPT

Joanna Then-Obłuska and Alexandra D. Pleşa

Between 1927 and 1931, British archaeologists Guy Brunton and his wife Winifred recorded over 150 graves assumed to date from Late Dynastic to early Islamic times in the cemeteries of Matmar and Mostagedda, Middle Egypt. Sixty-four bead objects found in funerary context are now located in six museum collections. Recent studies of material found in these tombs and the radiocarbon dating of textile samples allowed for a revision of Brunton's initial chronology and an overview of the typology of the bead corpus based on the revised chronological framework. The analysis of the Matmar and Mostagedda corpus also opens the avenue for a study of the timeline, typology, use, and provenience of beads at sites in the Middle Egyptian Nile Valley during the Roman to early Islamic period.

INTRODUCTION

As in previous periods, beads are by far the most common class of artifacts placed in burials of the Roman to early Islamic periods in Egypt. Despite the ubiquity in the archaeological record and the potential for addressing a variety of topics of economic and socio-cultural history, knowledge about the production timeline, typology, use, and provenience of bead items of this period is in its infancy. In addition, there is a stark imbalance in the publication of material coming from Egypt's various regions. For instance, the typology, chronology, and provenience of beads coming from sites on the Red Sea is better known than that of counterparts in Middle Egypt. We address the current imbalance by overviewing a corpus of 64 Roman to early Islamic bead-and-pendant objects from Matmar and Mostagedda, two neighboring villages in Middle Egypt (Figure 1), which is largely unpublished and little known to specialists.

In 1927, British Egyptologists Guy Brunton and wife Winifred decided to start self-funded excavations on the outskirts of modern Matmar and Mostagedda in search of prehistoric remains. During five campaigns between 1927 and 1931, they cleared two strips of desert approximately 5.5 km long at each village, and discovered that the entire area had been almost uninterruptedly used for cultic, funerary, or habitation purposes from the Badarian to the early Islamic periods, after which it appears to have been largely abandoned.

Also scattered throughout the desert were necropolises which Brunton dated from the "Ptolemaic" to "early Arab" periods. Brunton likely excavated some hundreds of graves there, but only recorded 34 "Late and Ptolemaic" tombs at Mostagedda and 120 tombs of the "Roman and Coptic" periods (62 at Matmar and 55 at Mostagedda). The "Roman and Coptic" burials at Mostagedda "were scattered about in most of the areas north of the headland, especially in [area] 1400." Areas 300, 400, 500, 800, 900, and 1100 contained mostly burials datable to "early Roman" times, but also two "Coptic" graves (Figure 1, a). The necropolises in areas 1400, 1800, 1900, 10100, and 11700 were dated to "Coptic" times but included three "early Arab" graves as well. At Matmar, graves of the "Roman and Coptic" periods were mainly found in areas 600, 800, 900, 1000, and 1100, and to a lesser extent in areas 1300 and 3200 (Figure 1, b) (Brunton 1937:136-142, 1948:91-94). The location of these tombs is only vaguely provided. Brunton labelled excavation areas with round numbers in the order of hundreds or thousands, and tombs received unique numbers within the area number, but the precise location was only recorded for a fraction of the tombs.[1]

For her doctoral dissertation, Alexandra D. Pleşa (2020) had the opportunity to document the burial inventories of Brunton's "Ptolemaic to early Arab" graves, including a detailed record and photographs of the bead objects presented in this study. The large discrepancies between Brunton's original dating and the typology of museum material required a revision of the chronology of individual graves as well as the general timeline of the necropolises. The comparative analysis of the surviving museum material, Brunton archive, published records, and radiocarbon dates of 20 textile samples[2] indicated that most "Roman," "Coptic,"

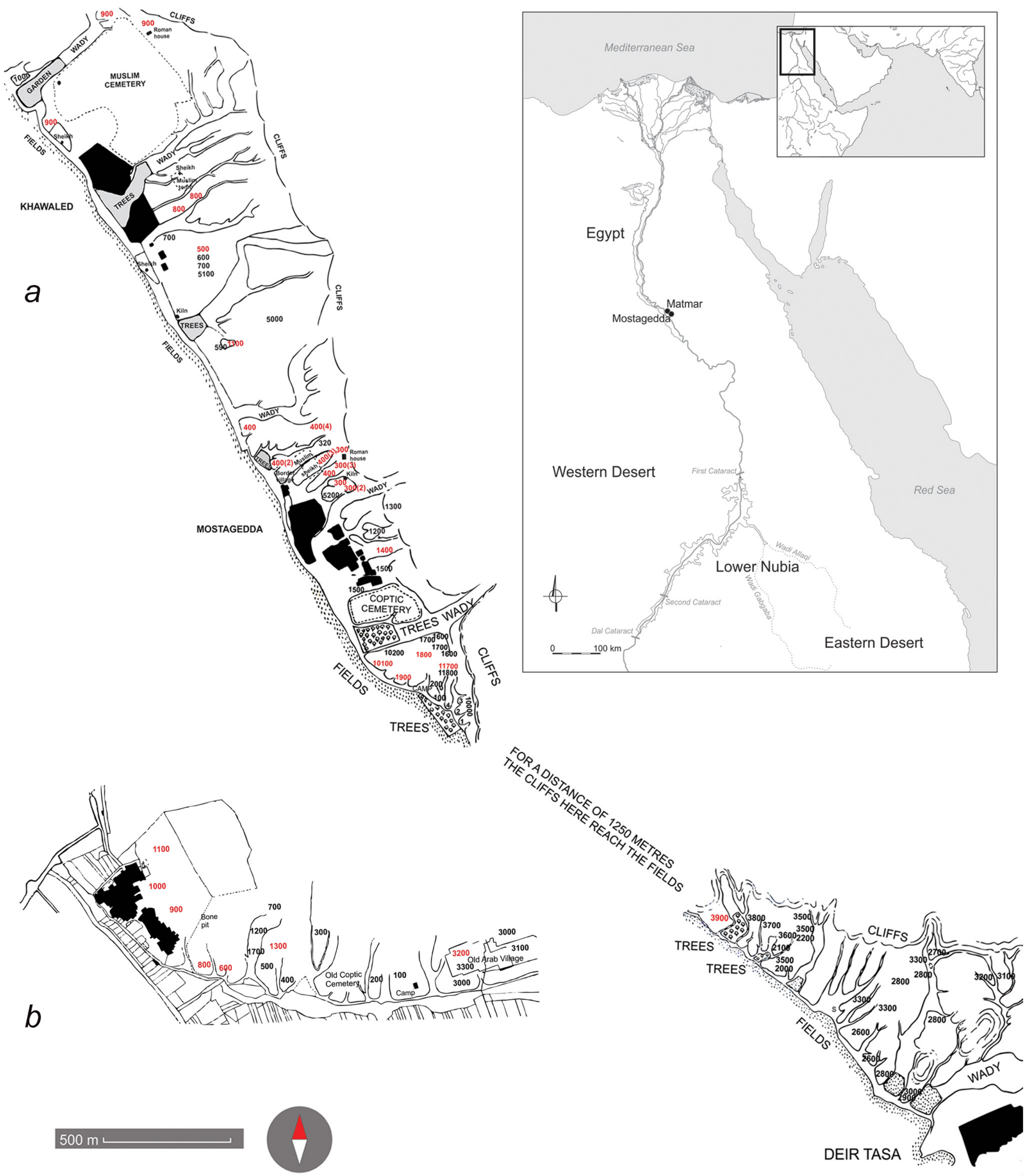

Figure 1. Locations of cemetery excavations at Matmar and Mostagedda (areas with Ptolemaic to early Islamic graves are marked in red): a, excavations north and south of Mostagedda (adapted from Brunton 1937); b, excavations east of Matmar (adapted from Brunton 1948) (drawing: Szymon Maślak and Alexandra D. Pleşa).

and "early Arab" graves at the two sites were made sometime between the 4th and 8th, possibly early 9th, centuries. The timeline of the funerary activities at the two sites, however, was considerably different. The bulk of burials at Matmar were made during the 5th-6th centuries, whereas those at Mostagedda date to the 7th-8th centuries (Pleşa 2017a, 2020). Unfortunately, the insufficient recording and lack of museum material did not allow for a similar revision of the "Late Dynastic to Ptolemaic" graves at Mostagedda, though there are serious reasons to doubt the initial dating. Three textiles that came from unknown burials in area 3900 were initially dated to "Ptolemaic" times, but yielded radiocarbon dates of the early Islamic and Mamluk periods, suggesting not only that Brunton's dating for these graves is flawed, but that the area was in use during early Islamic and Mamluk times as well (Pleşa 2017a, 2020).

Brunton recorded several hundred jewelry items in the Ptolemaic to early Arab graves or on the surface, but shipped only a fraction of them to museums. In this study, we analyze a corpus of 64 bead items coming from these graves. The material is located in six museum collections,[3] and comprises necklaces, earrings, and individual beads. It comes primarily from child and female graves (11 tombs at Mostagedda and 33 at Matmar)[4] but also includes two items without a clear provenience (nos. 63, 64). The latter come from area 800 at Matmar, where they were either taken from plundered unregistered graves or from the surface (Brunton 1948:101, "Beads [two] Res.").

THE COLLECTION

We present the bead types encountered in the corpus and place them in the revised dating.[5] The overview of beads and pendants is structured according to organic (wood, amber, coral, marine mollusk shell, ostrich eggshell, bone) and non-organic (stone, faience, glass, metal-in-glass, metal) materials. For each of these groups, we discuss the technique of manufacture, the shape, and, whenever possible, the provenience. Nonetheless, the overview in Table 1 and the images in Figures 2-16 are organized according to the revised chronology of the tombs.

Parallels are drawn from sites of the 1st-6th centuries in Egypt, the Levant, and the Arabian Peninsula, Nubian sites of the Classic Meroitic (1st-3rd centuries) and post-Meroitic (4th-6th centuries) periods, as well as Scandinavian, Baltic Sea, and Black Sea sites attributed to the period between the 7th and the beginning of the 9th centuries. We discuss the dating of the bead objects in view of the proposed timeline and the dating of known published types.

Since the analysis was made after the initial documentation of the corpus, it is based only on high-quality images of the material. It was therefore not always possible to identify materials and technical aspects related to bead production and use. It is indicated when no clear identification could be made and additional discussions and preliminary observations are provided.

Wood

There are few wooden objects in the present corpus. Among them, a long barrel bead with ribbed decoration (Figure 6, 22.7) from a tomb of the 5th-6th centuries figures among the Greco-Roman types published by Nai Xia (2014:144, Plate XVI: R84). An amphora-shaped pendant from a grave of the 7th-8th centuries has a double-segmented collar below the perforated neck (Figure 12, 45.3).

Amber

The amber found in Egypt probably originated in the Baltic Sea region, although some pieces may have been made of a non-fossilized tree resin (Harrell 2012). All amber beads and pendants in this study are reddish in color, some with a dusty coating. They are standard to long beads, some almost tabular, and often have rounded edges. They measure from 5 mm to ca. 15 mm in diameter (Figure 3, 7.4; Figure 4, 12.1; Figure 7, 31.2;[6] Figure 9, 37.7; Figure 11, 42.10, 44.6; Figure 12, 45.2, 46.2, 47.2; Figure 13, 48.17-18). One long bead measures 20 mm (Figure 13, 50.1). Some beads are slightly faceted into square or rectangular cylinders, bicones, or cones (Figure 3, 8.2; Figure 4, 12.6; Figure 5, 19.6; Figure 7, 29.4; Figure 11, 44.12; Figure 16, 63.3). Shapes less frequently encountered are long spindle-shaped beads (Figure 7, 28.1), a large discoidal bead (Figure 7, 31.1), and a large tabular one (Figure 11, 44.5), the latter two measuring about 25 mm in diameter.

At Matmar and Mostagedda, amber beads were placed in tombs of the late Roman (4th-6th centuries; nos. 7.4, 8.2) to early Islamic periods (7th-8th centuries; e.g., no. 50.1). With the exception of 50.1 from Mostagedda, all amber beads were recorded at Matmar. No site on the Egyptian Red Sea coast or in the Eastern Desert has yielded such examples. Neither have they been found at Meroitic and post-Meroitic sites in Nubia. The largest published collection of amber beads that provides parallels to the present corpus comes from the necropolis at Khirbat Yajuz in Jordan, and dates to the late Roman and early Byzantine periods (Eger and Khalil 2013).

Table 1. Bead Object Chronology and Associations at Matmar and Mostagedda.

Date		Site	Tomb no., area no. (object no.) – sex, age – beadwork
30 BC-AD 299	30 BC-3rd c. AD	Mostagedda	*Tomb 576*, area 500 (1) – child – necklace
AD 100-399	2nd-4th c.	Mostagedda	*Tomb 573*, area 500 (2) – plundered body
AD 200-399	3rd-4th c.	Mostagedda	*Tomb 588*, area 500 (3-4) – woman ca. 18 years old – two strings of beads around the neck; *Tomb 1104*, area 1100 (5-6) – strings of beads attached to earrings
AD 300-599	4th-6th c.	Matmar	*Tomb 623*, area 600 (7-8) – female
AD 400-599	5th-6th c.	Matmar	*Tomb 601*, area 600 (9) – child – necklace; *Tomb 615*, area 600 (10); *Tomb 801*, area 800 (11) – six-year-old child – necklace; *Tomb 802*, area 800 (12) – three-year-old child – necklace; *Tomb 824*, area 800 (13) – eight-year-old child – necklace; *Tomb 825*, area 800 (14) – four-year-old child – necklace; *Tomb 829*, area 800 (15) – two-year-old child – necklace; *Tomb 834*, area 800 (16) – three-year-old child – necklace; *Tomb 843*, area 800 (17) – child; *Tomb 853*, area 800 (18-19) – six-year-old child – necklace; *Tomb 855*, area 800 (20) – necklace; *Tomb 1068*, area 1000 (21-22) – three-year-old child – necklace
AD 380-599	End of 4th-6th c.	Matmar	*Tomb 831,*[7] area 800 (23) – four-year-old child – necklace
AD 400-699	5th-7th c.	Matmar	*Tomb 832*, area 800 (25) – adult
		Mostagedda	*Tomb 577*, area 500 (24) – child – necklace
AD 500-699	6th-7th c.	Matmar	*Tomb 812*, area 800 (26) – six-year-old child – necklace; *Tomb 862*, area 800 (27) – eight-year-old child – necklace; *Tomb 1027*, Area 1000 (28) – ten-year-old child – necklace; *Tomb 1035*, area 1000 (29) – six-year-old child – necklace; *Tomb 1040*, Area 1000 (30) – four-year-old child – necklace; *Tomb 1045*, area 1000 (31) – seven-year-old child – necklace; *Tomb 1060*, area 1000 (32) – three-year-old child – necklace; *Tomb 1080*, area 1000 (33) – twelve-year-old child – necklace; *Tomb 1101*, area 1100 (34) – child, almost adult – necklace; *Tomb 1102*, area 1100 (35) – female – necklace
		Mostagedda	*Tomb 574*, area 500 (36) – child – necklace
AD 555-699	Mid-6th-7th c.	Matmar	*Tomb 1013*,[8] area 1000 (37-40) – young female
AD 500-799	6th-8th c.	Mostagedda	*Tomb 1429*, area 1400 (41) – fourteen-year-old child – beads at neck and waist
AD 600-799	7th-8th c.	Matmar	*Tomb 873*, area 800 (42) – four-year-old child – necklace; *Tomb 874*, area 800 (43) – two-year-old child – necklace; *Tomb 885*, area 800 (44) – necklace; *Tomb 1033*, area 1000 (45) – ten-year-old child – necklace; *Tomb 1038*, area 1000 (46) – female – necklace; *Tomb 1053*, area 1000 (47) – six-year-old child – necklace; *Tomb 1301*, area 1300 (48) – eight-year-old child – necklace
		Mostagedda	*Tomb 1411*, area 1400 (49-57) – young girl – on body over the wrappings, on chest and pelvis
AD 600-824	7th-early 9th c.	Mostagedda	*Tomb 1844*, area 1800 (58-59) – necklace
AD 700-824	8th-early 9th c.	Mostagedda	*Tomb possibly 1441*, area 1400 (60-61) – child
Not dated	Possibly 5th-8th c.	Mostagedda	*Tomb possibly 1407*, area 1400 (62) – child – beads at neck
Not dated		Matmar	Area 800 (63, 64), surface finds or collected from unknown burials

Figure 2. Mostagedda objects 1-6, 1st-4th centuries (all images by the authors unless otherwise stated).

Figure 3. Matmar objects 7-10, 4th-6th centuries; original stringing: 7 (3.9 courtesy of Staatliches Museum für Ägyptischer Kunst, Munich).

Several different shapes of amber/resin pendants are present as well. A tabular example is most probably made of amber (Figure 9, 37.13). Another, much larger in size, has a tabular teardrop shape and measures about 13 mm in width (Figure 11, 42.15). An example of a flattened amphora shape may display a collar below the perforated neck (Figure 12, 45.4), while a fragment of a perforated neck most probably belongs to one of the amphora shapes (Figure 13, 48.7). Whereas the tabular pendant is dated to the mid-6th to 7th centuries, the other amber pendants are attributable to the 7th-8th centuries.

Coral

In general, the branches of Mediterranean Sea *Corallium rubrum* were cut into short standard and long cylinder beads, more or less regularly shaped (Figure 2, 1.2?, 6.14; Figure 3, 7.1?; Figure 4, 11.1; Figure 5, 20.3; Figure 6, 22.5, 23.2, 26.1; Figure 7, 27.2; Figure 8, 35.1, 35.6?; Figure 9, 37.15; Figure 12, 47.4). A long cylinder has incised collars at the ends (Figure 15, 55.2). Apart from one early Roman tomb at Mostagedda (no. 576) where beads of a faded, light salmon color (1.2) are tentatively identified as corals, all remaining coral beads were found in later funerary contexts.

Parallels for contemporary coral beads of similar shapes are abundant. Standard to long coral beads were found in Coffin B from Tomb LXVI at al-Bagawat (Kharga Oasis in the Western Desert of Egypt) which dates between the 4th and 7th centuries (MET 31.8.4). Other examples of coral beads from al-Baghawat come from Tomb XXIII (MET 31.8.33) of the 4th century. Small tubular coral beads are also found in late Roman contexts at Egyptian sites in the Eastern Desert and at the Red Sea (e.g., Then-Obłuska 2019a and references). Examples that are larger in diameter come from the post-Meroitic royal tombs at Qustul and Ballana in Lower Nubia (*see* Then-Obłuska 2016c for references).

Despite the wide presence of coral beads on site, only a few pendants made of *Corallium rubrum* were recorded. A long, curved example (Figure 5, 20.4) and another carved to a shape similar to an amphora (Figure 7, 27.6) come from tombs dated to the 5th-6th and 6th-7th centuries, respectively.

Marine Mollusc Shell

A variety of Red Sea and Mediterranean marine molluscs are reported at the two sites. Marine shells are typically perforated by cutting a hole in the whorl or dorsum, but a few examples from a tomb dated to the 7th-8th centuries at Matmar were shaped into beads (Figure 13, 48.4). So far, beads cut from marine shell have been recorded mainly in late Roman contexts at the Red Sea port sites of Marsa Nakari and Berenike (Then-Obłuska 2019a), in the Eastern Desert at Shenshef and Sikait (Then-Obłuska 2017a, 2019b), and in the mid-4th-century tombs at the Blemmyan Wadi Qitna site in the Nile Valley (Then-Obłuska 2016a, wrongly identified as a bone bead).

Nassarius gibbosulus was the only species of Mediterranean Sea provenience in the collection that was perforated (Figure 5, 17.1; Figure 8, 32.3, 33.1; Figure 15, 57.3; Figure 16, 61.1). The examples from Matmar and Mostagedda were perforated by cutting a hole in the shell dorsum, and came from tombs of varied chronology, dating from the 5th century to as late as the beginning of the 9th century. Analogous examples have also been recorded in late Roman contexts at Berenike, as well as in a 4th-century Blemmyan grave at Bab Kalabsha (Then-Obłuska 2015 and references).

Except for an example of unidentified shell species (Figure 10, 41.1) and the above-mentioned *Nassarius gibbosulus*, all other perforated mollusc shells are of species living in the Red Sea. The first is *Clanculus pharaonius* (Figure 2, 5.1) found in a tomb at Mostagedda dated between the 3rd and 4th centuries.

Conus taeniatus (Figure 10, 40.1; Figure 11, 43.11?; Figure 13, 48.2?; Figure 15, 57.2) comes from tombs dated between the mid-6th and 8th centuries. The species is documented in late Roman contexts at Berenike (Then-Obłuska 2015: Figure 1.13) and al-Bagawat (MET 31.8.33 from the 4th-century Tomb XXIII).

Cypraeidae sp., a large shell measuring about 30 mm in length (Figure 2, 5.1), was found in a tomb dating between the 3rd and 4th centuries at Mostagedda. A similar specimen 45 mm in length, provided with two perforations, was recorded in a late Roman rubbish pit at Berenike (Then-Obłuska 2015: Figure 1.12). *Cypraea (Monetaria) annulus* (Figure 2, 1.1, 3.1) was found in both early and late Roman tombs at Mostagedda. Examples from Berenike have been found in late Roman contexts (Then-Obłuska 2015: Figure 1.14).

Long beads cut from dentalium shells (Figure 9, 37.4, 38.1) have been found in a tomb datable to the mid-6th to 7th centuries. Based on the illustrations, it is unclear whether the segments belong to *Dentalium* sp. or *Dentalium reevei*, a species with nine ribs. Both species have been found in early and late Roman contexts at Red Sea coastal and Eastern Desert sites (Hamilton-Dyer 2001:363, Figure 11.5: 96, Mons Claudianus, 2007:348-349, Figure 14.8.51 [*Dentalium reevei*], 14.8.52 [*Dentalium* sp.], Mons Porphyrities; Then-

Figure 4. Matmar objects 11-16, 5th-6th centuries; original stringing: 12, 14, 16.

Figure 5. Matmar objects 17-20, 5th-6th centuries.

Obłuska 2017a: Figure 6.11, Shenshef, 2019a: Figure 2.1, Marsa Nakari; Berenike, BE95-001-080#147, pers. obs.). Segments of similar shell species were also common in graves at el-Dur (Haerinck 2001: Plates 47.67-68, 140.217, 146.20, 156.3, 160.6, 245.9, 247.5, 265.9, 274.8, 305.8) on the west coast of the Oman peninsula, but these examples are considerably earlier, since the activity on site declined during the first half of the 2nd century.

Engina mendicaria (Figure 4, 16.1; Figure 15, 57.1) specimens were perforated by cutting a hole in the body whorl. They were found at Matmar in a tomb of the 5th-6th centuries and at Mostagedda in a tomb of the 7th-8th centuries. This species was also reported in early and late Roman contexts at Berenike (Then-Obłuska 2015: Figure 1.2, early Roman Berenike, body whorl cut; Figure 1.5, late Roman Berenike, apex removed).

Two beads found in a tomb dated between the mid-6th and 7th centuries (Figure 9, 37.9) may be made of *Marginella* sp. Similar examples were recorded in late Roman contexts at Berenike (Then-Obłuska 2015: Figure 1.6), as well as at Meroë in Nubia (MFA 23-2-303g). *Nerita* sp. (Figure 5, 17.9) has been recorded in a tomb of the 5th-6th centuries at Matmar. Similar examples were recorded in late Roman layers at Berenike (Then-Obłuska 2015: Figure 1.4).

Nacre, or mother-of-pearl, is an organic/inorganic composite material produced by some molluscs as an interior shell layer. The nacre pendants found at Matmar were most likely made of *Pteria macroptera*, a Red Sea species. They were cut into round plaques, have a protruding elongated suspension, and measure about 20 mm in height (Figure 7, 29.7; Figure 16, 63.6). Some were found in a tomb dated between the 6th and 7th centuries (Figure 7, 29.7); others are decontextualized (Figure 16, 63.6). Another type cut from nacre is a plaque of amorphous, possibly zoomorphic shape, provided with a regular round perforation (Figure 13, 48.13). It was found in a tomb dating to the 7th-8th centuries.

Ostrich Eggshell

Short cylinder beads made of ostrich eggshell (Figure 16, 59.2, 60.1, 61.2) were found in tombs made between the 7th and early 9th centuries. In the Egyptian Eastern Desert and at the Red Sea port of Berenike, however, they were mainly recorded in late Roman contexts (Then-Obłuska 2015, 2016a, 2017a, 2018b, 2019b). They were also found in the 4th-century Tomb XXIII, al-Bagawat, Kharga Oasis in the Western Desert, but wrongly identified as ivory (MET 31.8.32). Such beads became common at post-Meroitic sites in Nubia (Then-Obłuska 2018b).

Bone

A large bone barrel bead ca. 17 mm long and decorated with a double incision around the center (Figure 3, 7.3) was found in a tomb of the 4th-6th centuries. In addition, two types of amphora-shaped bone pendants distinguishable by the shape of the perforated neck were also recorded. The first type has a regular neck (Figure 6, 23.4), whereas the second has a narrow carved neck (Figure 6, 23.6). They were found together in a tomb dating between the end of the 4th century and the 6th century. A slightly different amphora pendant was found in Tomb XXIII at al-Bagawat (MET 31.8.33). Another pendant type is characterized by a double-segmented base and a similar double-segmented collar (Figure 13, 48.15). It was found in a tomb dated between the 7th and 8th centuries.

Several bone crosses were also recorded. One type was found in a tomb dated to the 7th-8th centuries. The flat body has a projection for suspension and flared arms decorated with double incised lines (Figure 13, 48.6). A cross from the same tomb has flared arms, a narrowed neck, and a central part decorated with two diagonally running lines (Figure 13, 48.14). Several crosses from an unidentified tomb at Matmar have flared arms decorated with incisions on one side (Figure 16, 64). In contrast to the rest, these examples lack a suspension lug and were perforated through the top of the upper arm.

Stone

A variety of stone beads and pendants are present in the corpus. In addition to soft stone (steatite), many types were made of hard stone including carnelian, agate, amethyst, amazonite, and beryl. The majority are made from stones that were likely mined in the Egyptian Eastern Desert (Harrell 2004, 2006, 2012), but some agate and amethyst beads may have originated in India.

Steatite

A short cylinder bead, almost black in color and most probably made of steatite, is fluted around its edge (Figure 6, 22.6). It came from a tomb dated to the 5th-6th centuries. A short oblate bead made of a soft whitish stone (Figure 15, 58.2) was found in a tomb dating between the 7th and the beginning of the 9th centuries.

Carnelian

Examples similar to the small ellipsoid carnelian beads at the two sites (Figure 2, 1.3, 3.2) were also often included in bead objects found in Nubia and datable to the first centuries AD (e.g., Then-Obluska 2016b). Carnelian or red agate standard bicones (Figure 2, 4.4, 6.15) were found together with globular beads in tombs dating to early and late Roman times.

Carnelian beads were also found at Matmar and Mostagedda in much later tombs of the 6th-8th centuries. These were worked into short oblate (Figure 8, 35.2), globular (Figure 8, 35.4; Figure 10, 40.4; Figure 11, 44.7), irregular globular (Figure 11, 42.7, 43.7; Figure 14, 51.1, Figure 15, 58.4), convex cone (Figure 11, 42.17), and short biconical shapes (Figure 10, 40.2). Faceted beads include a long hexagonal truncated bicone ca. 10 mm in length (Figure 10, 40.6) and a long rectangular truncated bicone ca. 15 mm in length (Figure 11, 43.10; Figure 12, 46.10; Figure 14, 51.2). Some faceted beads have less regular shapes (Figure 11, 44.11 [ca. 22 mm long], 58.9). Long faceted bicones are usually found in late Roman Egypt and post-Meroitic Nubia, from the 4th to 6th centuries (e.g., Then-Obłuska 2015, 2018b).

A red pendant in the shape of a poppy-seed capsule (Figure 15, 55.13) is usually found in New Kingdom and later assemblages in Egypt and Nubia (Beck 1928: Figure 24, B.3.d), and was clearly reused for burial.

Agate

The long barrels of banded agate (Figure 2, 4.2, 4.5, 4.8) have parallels in early Roman assemblages (Then-Obłuska 2018a: Figure 4.24-28). Globular beads of red banded agate (Figure 12, 46.3) and onyx (Figure 12, 46.11) with perfectly polished surfaces and very small holes are found in tombs of the 7th and 8th centuries.

Amethyst

Amethyst of a vivid purple color was shaped into standard and short bicones (Figure 2, 4.3), as well as globular forms (Figure 2, 4.6). Although short and standard-length beads came from a tomb dated to the 3rd-4th centuries at Mostagedda, these types appear earlier at other sites in Egypt and elsewhere in the Middle East. Short and standard bicones were found together with biconical and globular agate beads (cf. 4.4, 6.15 above), and long barrels of agate/onyx (cf. 4.2, 4.5 above) in a 1st-century grave at Berenike (Then-Obłuska 2018a: Figure 5). Furthermore, amethyst and red agate or carnelian bicone beads, agate long barrels, and white-banded black-glass long barrels (cf. 4.9 below) were among the beads in well-preserved wooden coffins dating to the beginning of the 1st century BC at En Gedi, an oasis on the shores of the Dead Sea (Spaer 1993:19, Plate IIA). Globular amethyst beads were found in Meroitic tomb Beg. S 125 at Meroë (MFA 21-2-375n; 7 mm diameter).

A few other types of amethyst beads, often much paler in color than the ones discussed above, could be distinguished. One type consists of small oval, probably slightly tabular, beads that measure 5-10 mm in length (Figure 8, 35.5; Figure 10, 40.5; Figure 12, 47.3). Another type comprises larger beads, of which long droplet/almond-shaped (Figure 6, 26.2; Figure 7, 28.3; Figure 11, 44.9, 44.14; Figure 12, 46.8; Figure 13, 50.2) and long oval examples (Figure 12: 46.7) can measure up to about 20 mm in length. These types appear in tombs dating to the 6th-8th centuries, but comparanda from Egypt date to earlier times. Amethyst beads were recorded in Tomb XXIII (4th century) at al-Bagawat (MET 31.8.33).

Droplet/almond-shaped amethyst beads and pendants were widely used in the 6th and 7th centuries across the Mediterranean and beyond. A fair number of examples of jewelry incorporating amethyst beads on metal links have been reported at sites in Egypt or the Eastern Mediterranean (Drauschke 2010). Droplet/almond-shaped amethyst beads were also imported into Europe starting in the late 6th century. Long beads of a paler color were similarly imported into Europe and Anglo-Saxon England in the mid-7th century (Brugmann 2004:40; Koch 1987:346).

There are amethyst deposits in the Eastern Desert in the Wadi el-Hudi (Shaw 2007; late Roman mine) and Abu Diyeiba regions. The latter is a very large mine that was a major source of amethyst during the Ptolemaic and early Roman periods (Harrell 2004, 2006). So far there is no evidence of amethyst mines in Egypt after the 6th century (James A. Harrell 2019: pers. comm.).

Amazonite

A large, round tabular bead measuring about 22 mm in diameter was found in a tomb dated to the 7th-8th centuries. It may be made of amazonite (Figure 13, 48.11), but a definite identification cannot be made on the basis of the illustrations.

Beryl

Some large cylinder beads of green beryl (Figure 2, 6.13; Figure 4, 16.4; Figure 5, 17.6?), were found in tombs dated to the 3rd-6th centuries. A teardrop pendant made of a stone that appears to be dark green in color, probably emerald, measures about 18 mm in length (Figure 15, 58.18). It was found in a tomb dating between the 7th and the beginning of 9th centuries. Both beryl and emerald are known to have been mined in the Eastern Desert in the Mons Smaragdus region (Harrell 2012 and references; Then-Obłuska 2019b).

Faience

A short cylinder bead made of red faience (Figure 2, 1.7) was found in an early Roman tomb at Mostagedda. Such small beads were produced in many colors and are common finds at early Roman sites in Egypt and Meroitic sites in Lower Nubia (Then-Obłuska 2015, 2016b). By the 3rd century, the production of faience had pretty much stopped in Egypt thus providing a *terminus ante quem* for the production of the examples found at Matmar and Mostagedda.

Glass and Metal-in-Glass

Glass and metal-in-glass beads are described below according to the technique of manufacture. Several types are associated with Egyptian production (drawn and segmented glass and gold-in-glass), while others relate to production centers in India/Sri Lanka (drawn and rounded glass) (e.g., Francis 2002; Then-Obłuska 2015 and references).

Drawn and Cut Glass

A translucent blue (Figure 13, 49.1) and some black (Figure 13, 49.2) beads are made of drawn glass but it is uncertain how their ends were finished. Wide short cylinders up to 7 mm in diameter and smaller short to standard cylinders about 3 mm in diameter are tube sections of drawn translucent green glass (Figure 8, 35.13). They were found in a tomb dating to the 6th-7th centuries.

A green translucent drawn tube decorated with alternating red and yellow stripes (Figure 15, 58.5) was found in a tomb dating between the 7th and the beginning of the 9th centuries. The bead was most probably made by cutting the tube into sections and fire polishing the ends. Similar styles figure among Islamic beads attributed to the 10th century by Lankton (2003: Figure 8.0, above, no. 700).

Drawn Glass and Metal-in-Glass with Pinched Ends

Translucent dark blue beads (Figure 2, 2.1) were made from a drawn tube that was cut or pinched into sections whose ends were then fire polished. The same procedure was also used to create a long ellipsoid bead of green glass (Figure 2, 6.6), a long translucent blue bicone (Figure 3, 7.2), and several smaller oblates of dark blue (Figure 2, 6.4), green (Figure 2, 6.9) and black glass (Figure 2, 6.11). Most of these beads were found in tombs dating to before the 4th century.

This technique of manufacture may have been used for beads found in later tombs. Translucent amber ellipsoids (Figure 6, 24.2) and long cylinders of opaque green glass about 5 mm in diameter and 8 mm in length (Figure 7, 27.1) are most probably pinched-off sections of drawn tubes. This might also be the case for several very long dark blue cylinders (Figure 8, 34.8, 34.9) about 20 mm in length that were found in tombs of the 5th-7th centuries.

There are a number of decorated beads dating to the 7th-8th centuries that were produced in an identical fashion. A few globular, semi-translucent green beads roughly 7 mm in diameter have slight traces of ribbing similar to melon beads (Figure 11, 42.9). Other globular beads represent sections of drawn black tubes with applied white stripes (Figure 11, 42.11), or sections of glass tubes with yellow, white, and red stripes (Figure 11, 42.16). A long bead made of brown glass (Figure 15, 58.7) was found in a tomb dating between the 7th and the beginning of the 9th centuries.

In addition to glass beads, several metal-in-glass types were also cut or pinched from tubes and had the ends fire polished. These gold-in-glass globular beads (Figure 2, 1.6, 3.5, 6.7), bicones (Figure 2, 1.4), and silver-in-glass globular beads (Figure 2, 2.2, 6.8) were found in tombs dating between the 1st and 4th centuries.

Drawn Segmented Glass and Metal-in-Glass

Drawn glass and metal-in-glass (cf. below) tubes were formed into single or multiple segments that were usually globular or oblate and of varying length (disc and short). They differ according to the size and shape of the interspaces, which probably reflect the form of the mold in which the beads were segmented. These are among the most common bead types found in Egypt and Nubia between the 1st and 6th centuries (e.g., Then-Obłuska 2015; Then-Obłuska with Wagner 2019).

Single-segment beads are small, usually oblate to globular, and 3-8 mm in diameter. At the two sites, they come from tombs dated to the 4th-6th centuries and continue to be placed in burials up to the 7th-8th centuries. They are opaque red (Figure 3, 8.5; Figure 9, 37.3, 38.2; Figure 11, 43.14; Figure 12, 46.12), black (Figure 3, 8.3; Figure

Figure 6. Matmar and Mostagedda objects 21-26, 5th-7th centuries; original stringing: 21.

Figure 7. Matmar objects 27-31, 6th-7th centuries.

5, 19.2; Figure 9, 37.6, 38.3; Figure 11, 44.2; Figure 12, 47.6), translucent and semi-translucent green (Figure 3, 7.4; Figure 4, 13.1; Figure 5, 19.1; Figure 6, 23.1; Figure 9, 37.1; Figure 13, 50.7), opaque green (Figure 11, 44.1), translucent dark blue (Figure 8, 34.5, 35.9; Figure 9: 37.17; Figure 11, 42.5), semi-translucent yellow (Figure 9, 37.8; Figure 11, 43.12; Figure 15, 55.1), translucent turquoise (Figure 11, 42.6), translucent golden yellow (Figure 11, 42.4), and opaque blue (Figure 11, 43.4). Some beads are preserved as double-segments in red (Figure 9, 38.4), opaque green (Figure 11, 43.6), and dark blue (Figure 11: 43.9). There are also small and black double- and multiple-segmented beads (Figure 11, 42.3, 42.18) in tombs from Matmar. No colors can be provided for many single- and double-segment beads (Figure 3, 9.2, 9.4) due to the limited resolution of the illustrations. Larger examples about 8 mm in diameter in translucent yellow or amber glass may be imitations of gold-in-glass types (Figure 4, 13.3).

Some single-segment small beads from tombs of the 7th-8th centuries are standard cylinders of varied color. The corpus includes yellow (Figure 11, 42.1, 43.16), green (Figure 11, 42.2, 43.1), blue (Figure 11, 43.2), dark green (Figure 11, 43.5), and black long cylinder-like beads (Figure 11, 42.14). One dark green cylinder has a yellow layer discernible at the end (Figure 11, 43.15). A yellow oblate from a tomb of the 7th-8th centuries was decorated with ribs (Figure 13, 50.4).

Small, single-segment beads of gold-in-glass (Figure 3, 10.2; Figure 5, 18.7; Figure 6, 24.1; Figure 8, 35.3, 36.8; Figure 9, 37.2) and silver-in-glass (Figure 3, 8.4; Figure 5, 19.5) are either regular or oblate to globular in shape, as are several small gold-in-glass (Figure 6, 25.2) and silver-in-glass (Figure 5, 17.2, 19.3; Figure 8, 36.2; Figure 11, 42.8) double-segments. A gold-in-glass quadruple-segment bead has short oblate segments (Figure 5, 18.6). Single- (Figure 8, 32.7), quintuple- (Figure 5, 18.14) and octuple-segment beads (Figure 4, 12.7) have oblate disc segments. Other examples are long single-segment beads (Figure 8, 32.8). These regular single- to multiple-segment beads made of metal-in-glass are found in tombs dated to the 5th-6th and 7th-8th centuries. Some single-segment gold-in-glass beads that were found in a grave of the 5th-6th centuries are larger, measuring about 8 mm in diameter (Figure 5, 20.2).

One type of double-segmented gold-in-glass bead has very wide and deep spaces between the segments (Figure 4, 13.2; Figure 6, 22.4). This type is found in Matmar tombs dated between 400 and 599. A similar example was placed together with other beads in Coffin B of Tomb LXVI at al-Bagawat which is dated to between the 4th and 7th centuries (MET 31.8.4). Another gold-in-glass double-segmented bead from a tomb dating to the 5th-6th centuries has a very narrow and shallow interspace (Figure 4, 14.2), as do several multi-segment beads (Figure 8, 34.11) from a tomb of the 6th-7th centuries.

Some silver-in-glass single-segment beads are globular and practically lack any trace of segmenting (Figure 13, 50.5; Figure 15, 55.7). These were found in funerary contexts of the 7th-8th centuries.

Some triple-segmented gold-in-glass beads have a longer central segment on account of which they are called collared beads (Figure 4, 16.3; Figure 5, 17.8; Figure 8, 36.1). They were found in tombs that span the 5th-7th centuries. Contrary to most other examples that are transparent, some of the collared beads are made of a translucent golden yellow glass (Figure 9, 37.21; Figure 13, 50.6). The same type of glass can be observed in several single-segment beads (Figure 9, 37.18; Figure 11, 42.19, 44.8; Figure 13, 48.16, 50.3; Figure 15, 55.12). Interestingly, golden yellow examples come from tombs of a slightly later date, ranging from the mid-6th to 8th centuries.

Several gold-in-glass single-segments found in graves of the 5th-7th centuries are ribbed (Figure 4, 16.5; Figure 5, 18.12; Figure 7, 27.3). Several triple-segment gold-in-glass beads of similar date at the two sites are also ribbed (Figure 4, 13.4, 15.3; Figure 5, 20.5). A similar earlier example comes from the 4th-century Tomb XXIII at al-Bagawat (MET 31.8.33).

A dainty gold-in-glass bead found in a tomb dated to the 3rd-4th centuries exhibits three rows of granulation (Figure 2, 3.6), and is similar to beads found in tombs at En Gedi dated to around the beginning of the 1st century (cf. above Spaer 1993:19, Plate IIA).

Some triple-, quadruple-, and septuple-segmented silver-in-glass beads found in a tomb of the 5th-6th centuries (Figure 6: 22.1, 22.8, 22.9) are characterized by an inner glass layer that is much smaller in diameter than the overlying layer. The difference creates a slight space between the layers that is discernible in every segment.

Drawn and Rounded Glass

Drawn and rounded green glass beads (Figure 4, 11.2, 14.1; Figure 6, 23.3; Figure 18, 18.3) have been found in tombs dated between the end of the 4th and the 6th centuries. Parallels are common at Egyptian Red Sea ports and at the surrounding desert sites during the late Roman period (Francis 2002; Then-Obłuska 2015, 2017a, 2018a, 2019a, b). The chemical composition of early Roman examples found

Figure 8. Matmar and Mostagedda objects 32-36, 6th-7th centuries (figure 8.36 courtesy of The National Museum, Bloemfontein, South Africa).

Figure 9. Matmar objects 37-38, mid-6th-7th centuries.

at Quseir indicates a South Indian/Sri Lankan provenience (Then-Obłuska and Dussubieux 2016). The type has also been reported in layers datable to the same period at sites along the Nile Valley in Sudan, as well as at some sites in ancient Aksum (Then-Obłuska 2019c). Examples from Sudan have been identified both macroscopically and in the laboratory as Indo-Pacific beads of South Indian/Sri Lankan origin (e.g., Then-Obłuska and Wagner 2019; Then-Obłuska with Wagner 2019).

Several opaque light green beads (Figure 6, 21, 22.3) from a tomb dated to the 5th-6th centuries also appear to have been made of drawn and rounded glass. Their quality (bubbles in the glass core), however, is lower than that of drawn glass beads of Indian/Sri Lankan origin, which precludes this provenience.

Wound Monochrome Glass

Transparent wound glass was used to manufacture long beads that are generally between 10 mm (Figure 15, 55.10) and 20 mm in length (Figure 15, 58.15). Large globular beads ca. 15 mm in diameter were also made of transparent wound glass (Figure 15, 58.11). All these transparent beads come from tombs dated between the 7th and the beginning of the 9th centuries.

Translucent blue, green, and purple flattened beads (Figure 14, 52-54) were found in tomb 1411 at Mostagedda, which is dated to the 7th-8th centuries There are similar green examples that date to the late Roman period (Arveiller-Dulong and Nenna 2011:188, cat. 233).

Some simple short oblate beads are made of a translucent dark green glass (Figure 8, 35.8; Figure 9, 37.19) while others about 15 mm in diameter are composed of dark blue or black glass (Figure 8, 33.2). Long spindle-shaped beads (Figure 3, 9.1, 9.3) and a cylindrical example in translucent dark green (Figure 8, 32.9) seem to be wound, judging from the illustrations. A long bicone of opaque green glass is most probably made of wound glass (Figure 10, 39.8), as well as a tapered long cylinder of dark blue glass (Figure 13, 48.10).

Several double-, triple-, and quadruple-segment beads of translucent dark blue glass appear to be wound (Figure 8, 32.1-2, 32.4-5 [this is also a double-segment although only a fragment is visible]). They measure about 5 mm in diameter and were found in a tomb dated to the 6th-7th centuries.

There are several decorated examples. For instance, a long barrel bead of translucent dark blue glass is adorned with a spiral-fluted pattern (Figure 6, 22.2), while a long black bead has slightly twisted longitudinal ribs (Figure 12, 46.4).

Wound Bichrome Glass

Some long barrel beads were made by winding black and white glass into a zoned configuration (Figure 2, 4.9, 4.10). They were found in a tomb dated to the 3rd-4th centuries. Similar globular black beads roughly 10 mm in diameter exhibit a trailed white line around the middle (Figure 11, 44.4, 62.8). They came from tombs dated to the 7th-8th and 5th-8th centuries.

Wound Glass with Applied Stratified Eyes

Some beads from early Roman tombs at Matmar and Mostagedda are decorated with stratified eyes set into the translucent light blue body. The eyes were made by alternating three layers, two white and one transparent, and placing a central translucent blue dot on top (Figure 2, 1.5). The eyes of a bead from a tomb dated to the 3rd and 4th centuries have three white layers alternating with two colorless ones (Figure 2, 6.16). There are notable parallels for the beads found on site, but all have been recorded in considerably earlier contexts.

In general, blue beads with seven eyes were popular in the Late Period, Ptolemaic, and early Roman periods in Egypt (Arveiller-Dulong and Nenna 2011:168-169, cat. no. 209.2, 6th-3rd centuries BC, 220-221, cat. nos 299.26, 72, 74, 79, 1st century BC-1st century AD) and in the Meroitic period in Nubia (Dunham 1963:152, Figure S, Type XIj; W 159 [50-55]?). Examples from the Northern Black Sea region also date from the 1st century BC to the 1st century AD (Alekseeva 1975: Type 68, Plate 14:21-23). Similar stratified eye beads are known from Taxila, Pakistan (Beck 1941: Plate I:14), Persepolis, Iran (Dubin 2009:382, note II, Object 23, Plate 334, Figure 23, 300 BC), Xu Jialing, China (Gan et al. 2009: Figure 24.1, 500 BC), Niya in Xinjiang, China (Lin 2010:204, Figure 4, 1st century BC-4th century AD), and the Sen-Mu-Sai-Mu grotto site, Kuche county, China (Liu et al. 2012: Figure 2: XJ-34, late 2nd to early 3rd centuries, Eastern Han Dynasty). The latter falls into a chemical compositional group defined for Sasanian glass (Liu et al. 2012:2137). A bead similar to 6.16 was found in an early Roman context at Berenike (Then-Obłuska 2015: Figure 5:17, BE11-76/999/PB021, D7.7, L6.4, HD2.7).

Folded Monochrome Glass

Some dark green elongated beads from a tomb dated to the 3rd-4th centuries seem to bear traces of a seam which typically results from folding a glass strip around a mandrel (Figure 2, 6.5). Several examples that appear black in the

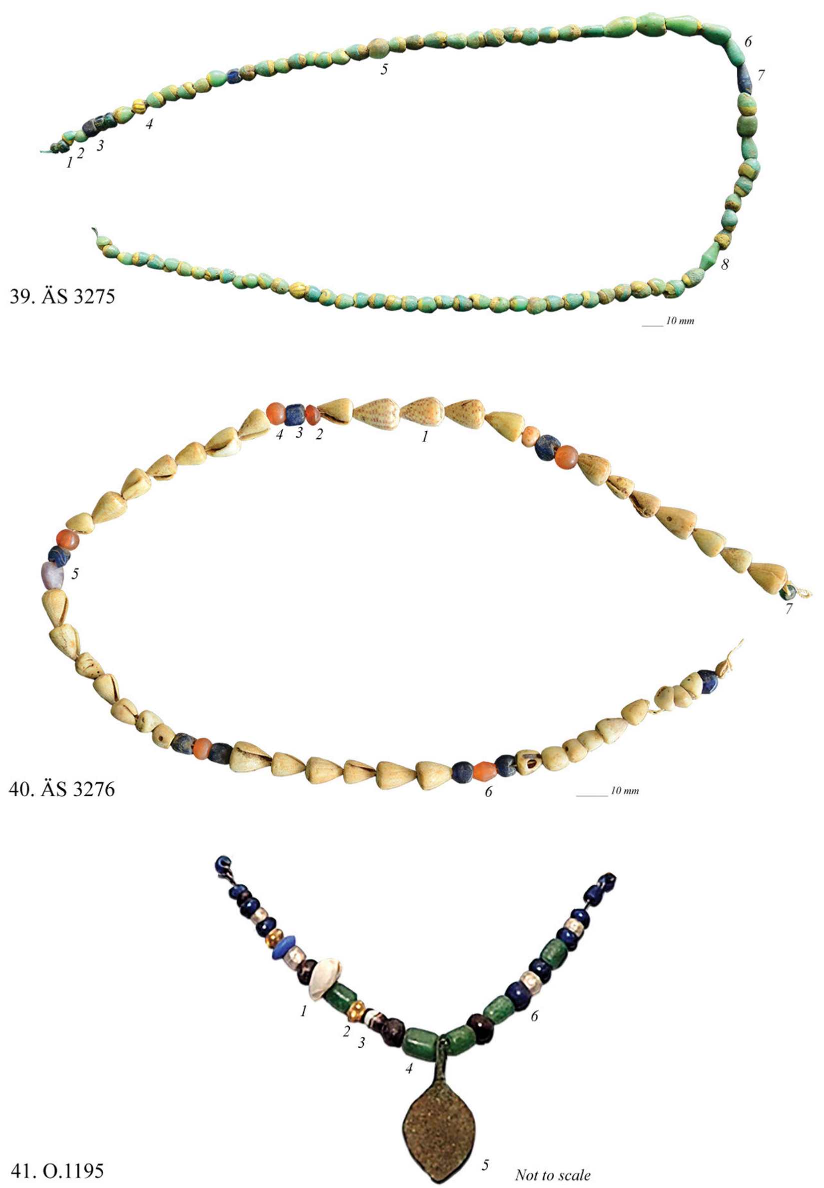

Figure 10. Matmar and Mostagedda objects 39-41, mid-6th-8th centuries (10.41 courtesy of The National Museum, Bloemfontein, South Africa).

Figure 11. Matmar objects 42-44, 7th-8th centuries.

illustrations but may in fact be dark purple were formed by folding glass strips into globular shapes (Figure 3, 10.1). Long strips of black glass were also folded into spindle-shaped beads (Figure 4, 13.5) and are associated with a grave of the 5th-6th centuries. The same technique was used to create larger beads of clearly dark purple color with a ca. 10 mm diameter (Figure 8, 34.11). They were placed in a grave of the 6th-7th centuries together with a roughly shaped bead that bears traces of a seam (Figure 8, 34.4) and likely belongs to the same typological group.

A long conical dark blue bead 15 mm in length may be made of folded glass, but the seam is not discernible in the illustrations (Figure 7, 27.5). The same production method may have been employed for a long bicone of translucent yellow amber (Figure 7, 27.4). Both types were found in a tomb dated to the 6th-7th centuries.

Folded Bichrome and Polychrome Glass

Black-and-white banded glass strips were folded into elongated (Figure 2, 3.4; Figure 8, 36.7?; Figure 15, 55.5, 55.8, 55.14), long cylinder (Figure 2, 6.1), globular (Figure 2, 6.3), and ellipsoid shapes (Figure 8, 36.6). These beads appear in tombs dated to the 3rd-4th centuries and continued to be placed in graves of the 7th-8th centuries. Another type was made by folding a band of mosaic striped glass into a long cylinder. The several examples of this type exhibit two white stripes alternating with two dark blue or black ones, and have golden-yellow ends (Figure 15, 55.6; Figure 16, 60.7). They were found in two graves of the 7th-8th and 8th-early 9th centuries, respectively.

A long hexagonal (?) capped mosaic cylinder found in a tomb dating to the 7th-8th centuries was most probably made by folding a preformed strip of fused cane sections (Figure 12, 46.6). Two different cane sections, one with a concentric pattern of white, red, white, and dark blue rings surrounding a dark blue center and the other with a quatrefoil with yellow leaves, were applied in an alternating fashion with red caps at the ends. Somewhat similar beads date to the 2nd and 3rd centuries, and continue into Byzantine times (Spaer 2001: cat. 221-2). Examples that are decorated with a checkerboard pattern instead of an eye are later and come from contexts dating between 750 and 800 (Callmer 1997:199, Plate 16, A13, 2003:42, Figure 4.2, A13).

Joined Glass

Joined glass beads of diverse patterns have only been recorded in tombs of the 7th to early 9th centuries. Some beads in the corpus have globular or elongated shapes and were made by joining mosaic cane sections with eye patterns. The mosaic cane sections of the globular examples have a concentric pattern of red, white, and blue rings around a yellow center (Figure 15, 58.3). Beads made of similar cane sections are tentatively associated with Egypt and are dated either to after 600 (MET 10.130.3285, 10.130.3286) or to the 1st century (MET 10.130.3294). In Lower Nubia, a comparable bead was found at Serra East and is dated to the Christian period (post 6th century) (OIM E24655; pers. obs.).

The cane sections of the elongated beads have a yellow center bordered by a red ring and radial stripes of translucent dark green and opaque yellow colors, the latter appearing as light green (Figure 15, 58.10). Beads made of such cane sections are typically associated with Egyptian production and usually date to the 9th century (MET 10.130.3288).[9] Lankton (2003:76, Figure 8.2) associates this type with bead production in Fustat (Old Cairo) during the 9th-11th centuries. A type with a cane section having the same pattern found in Scandinavia and the Baltic region is dated between 750 and ca. 800, and described as of “oriental origin” (Callmer 1997:199, Plate 16, A33, 2003:42, Figure 4.2, A33).

The mosaic cane sections of some globular and elongated beads have a yellow center that is bordered with a red ring which contains radial(?) stripes in translucent dark blue and white, appearing light blue (Figure 15, 58.8, 58.17). This type is also well represented in Scandinavian and Baltic assemblages. It is also of oriental origin and dated to the first quarter of the 9th century (Callmer 1997:199, Plate 16, B22, 2003:42, Figure 4.2, B22). In contrast to the above-mentioned types, the mosaic cane sections of another globular bead have a white center (Figure 15, 58.16).

Mandrel/Rod-Pierced Glass

A semi-translucent blue glass strip (Figure 4, 13.6) and an opaque green one were most probably pierced with a rod/mandrel and marvered into beads (Figure 5, 18.5). Teardrop pendants with one side flattened were perforated by mandrel piercing. They are made of transparent (Figure 4, 11.3) or translucent dark blue glass (Figure 4, 12.4), and were found in tombs dated to the 5th-6th centuries. Additionally, one such pendant (Figure 8, 34.3) was threaded together with six other irregularly shaped dark blue pendants in a necklace found in a tomb dating to the 6th-7th centuries at Matmar. The irregularly shaped pendants have a tabular shape and rounded or tapered bases (Figure 8, 34.1). In general, blue glass teardrop pendants with rounded bases are found in

Figure 13. Matmar and Mostagedda objects 48-50, 7th-8th centuries.

Figure 12. Matmar objects 45-47, 7th-8th centuries.

assemblages of the early and late Roman periods, and are known to have been produced locally (Arveiller-Dulong and Nenna 2011:188, cat. 232). Their use, however, does not seem to have been restricted to Egypt alone, as one example was found in a tumulus tomb dated to the 5th-6th centuries at El-Zuma in Nubia (Then-Obłuska 2017b: Figure 3).

Another type frequently encountered in tombs of the 5th-8th centuries, predominantly at Matmar, was made by mandrel piercing and marvering a green glass strip with a yellow cap into a biconical or globular shape (Figure 4, 15.5; Figure 5, 18.4; Figure 7, 29.6, 31.5; Figure 10, 39.2; Figure 15, 55.11) or a long conical shape (Figure 5, 18.2, 20.1, 20.6 [probably a fragment]; Figure 7, 31.3, 31.6 [probably an unfinished 31.3 bead]; Figure 8, 33.4; Figure 11, 43.13; Figure 13, 48.1) (Meyer 2014:83, Plate 34b, green "date" bead with one yellow cap).

Examples of opaque yellow and translucent colorless striped glass (Figure 4, 12.1, 15.2; Figure 5, 18.13; Figure 7, 29.3; Figure 9, 37.5; Figure 10, 39.4), as well as translucent green and opaque yellow striped glass (Figure 4, 12.3, 15.4; Figure 7, 29.1), were most probably mandrel pierced and marvered to form a slightly biconical bead. This type also presents slight variations, another example having yellow and red stripes (Figure 9, 37.16). All striped glass bicones are from tombs dating to the 5th-7th centuries and have parallels of similar chronology. For example, a yellow and colorless striped mosaic bicone was recorded at the Byzantine site of Bir Umm Fawakhir in the central Eastern Desert of Egypt (Meyer 2014:83, Figure 40 l, Plate 34c; 5th-6th centuries).

A piece of semi-translucent green glass was mandrel pierced and decorated with sections of mosaic eye canes. The eyes are red spots encircled by yellow rings (Figure 13, 50.9). The example comes from a tomb dated to the 7th-8th centuries, which also yielded green glass cane beads covered either with stripes of yellow, red, white, and green (Figure 13, 50.8, 50.11?, 50.12?) or yellow, black, and white (Figure 13, 50.10).

Mandrel-Pierced and Folded Glass

Traces of a seam which indicate a folding over of the glass after piercing can be discerned on a group of conical opaque green beads found in tombs of the 6th-7th centuries (Figure 7, 30.1). Some of them are tabular (Figure 7, 30.2, 31.4).

A mosaic-glass bead with a yellow center and radial petals in black and white from a tomb of the 5th-6th centuries (Figure 5, 18.11) was most probably mandrel-pierced. Similar examples have been found at Kertch on the Black Sea in layers dating to the 2nd-4th centuries (Arveiller-Dulong and Nenna 2011:162, cat. 206: 16 and 18).

Opaque yellow and translucent green striped glass with a yellow cap at one end was pierced and folded around the mandrel to form long conical beads (Figure 4, 15.1; Figure 5, 18.9; Figure 7, 29.2; Figure 9, 37.11). This type is present in tombs dating to the 5th-7th centuries.

Mandrel-Formed Glass

The exact technique of manufacture of several mandrel-formed beads – whether winding, folding, or rod piercing and folding – remains uncertain. Many of them were marvered on a flat plate to impart facets. One of these beads is a long cylinder of translucent dark blue glass that is ca. 20 mm long (Figure 12, 46.9). Others include long hexagonal cylinders of opaque dark blue glass about 5 mm in diameter (Figure 4, 12.5; Figure 7, 29.5). Some hexagonal cylinders of opaque blue (Figure 5, 17.5) and opaque green (Figure 5, 17.3; Figure 6, 23.5; Figure 8, 33.3) glass are much larger, measuring about 10 mm in diameter. A similar example from the MET collection, presumably from Egypt, dates to the 3rd-4th centuries (MET 10.130.3154). Longer versions of hexagonal cylinders are also present. They are made of translucent dark green glass (Figure 12, 47.5) and measure about 6 mm in diameter and 10 mm in length.

A long rectangular bicone is made of semi-translucent blue glass (Figure 11, 42.12). Long hexagonal bicones of translucent dark blue glass measure about 15 mm and 20 mm in length (Figure 7, 29.8; Figure 13, 48.3).

Some faceted beads of dark blue glass are in the form of cornerless cubes (Figure 4, 16.2; Figure 5, 17.4, 18.8; Figure 6, 25.1; Figure 8, 32.6, 34.2; Figure 10, 39.3, 40.3), one of which was longer than the rest (Figure 11, 44.13). Some beads bear traces of seams indicating that they may have been pierced and folded around the mandrel before being marvered into shape. They are from tombs dated to the 5-6th centuries but continued to be placed in burials in the 7th-8th centuries.

A phallic pendant found in a tomb dated to the 6th-7th centuries was most probably formed on a mandrel using light blue glass with a red and amber trail. Two eyes with red centers and yellow borders were applied (Figure 7, 28.2). It is probably a reused Roman amulet (*see* Spaer 2001, cat. 426 for phallus amulet and references).

The technique of production of three other mandrel-formed examples could not be identified. These are a large cylindrical green bead (Figure 8, 33.5), an almond-shaped

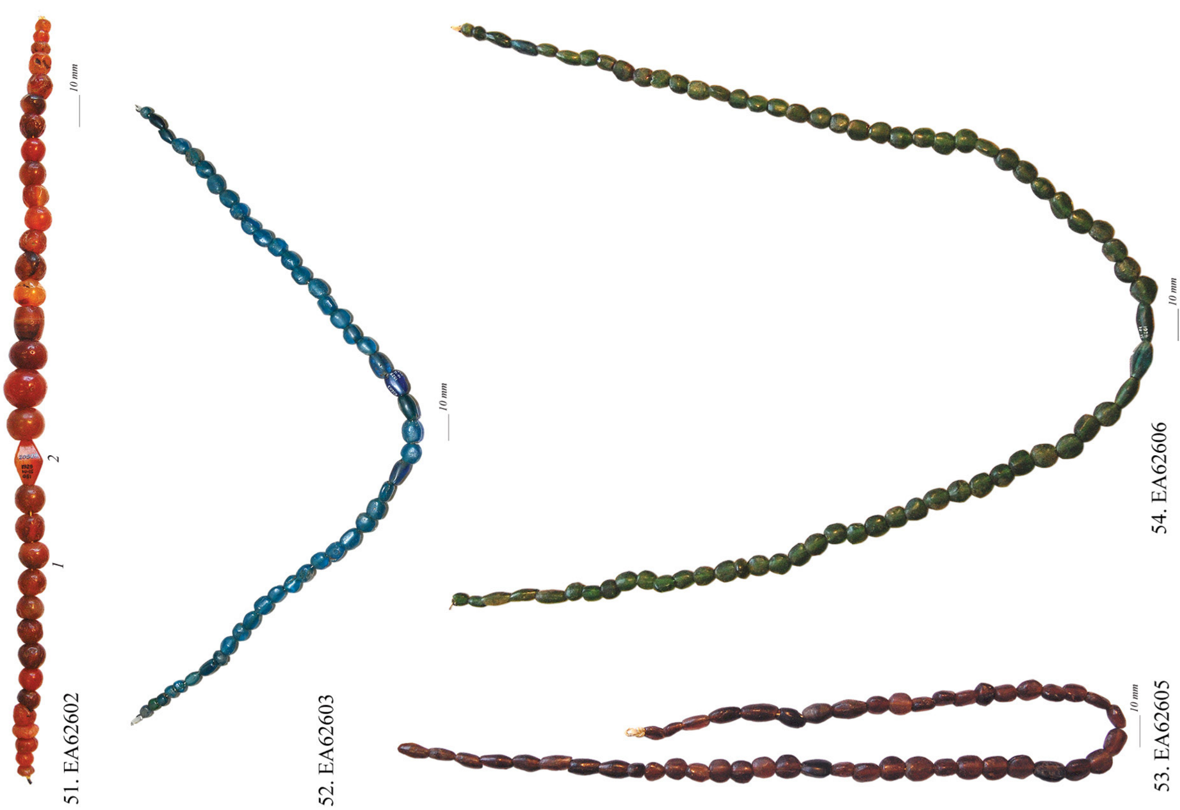

Figure 14. Matmar and Mostagedda objects 51-54, 7th-8th centuries.

Figure 15. Mostagedda objects 55-58, 7th-early 9th centuries.

bead (Figure 8, 34.7), and a blue toggle-shaped, rather misshapen, bead (Figure 8, 34.6). All were found in tombs dated to the 6th-7th centuries. One last notable example of this group is a bead made of white glass covered with a thin translucent blue layer (Figure 15, 58.20).

Metal

Only a few metal beads and pendants appear in the corpus. These are long beads of folded sheet metal (Figure 4, 13.5), a copper-alloy coin perforated for suspension (Figure 13, 48.9), a cross with long simple arms and provided with a suspension loop (Figure 11, 42.13), and a metal plaque pendant in the shape of a leaf or teardrop with a protruding suspension loop (Figure 10, 41.5). The coin was minted in Alexandria under the reign of Claudius (RPC I, 5175) and displays a caduceus between ears of grain and the legend AYTO-KPA on its reverse (Dr. Piotr Jaworski 2019: pers. comm.). The cross and coin were found in tombs dating to 7th-8th centuries; the leaf plaque was in a tomb dated to the 6th-8th centuries.

DISCUSSION AND CONCLUSIONS

By combining the dating of the Matmar and Mostagedda tombs with evidence of analogous beads published thus far, it is possible to provide a chronological overview of the use of bead and pendant types at the sites and, for a part of them, indicate their provenience.

Objects 1 to 6 (Figure 2) belong to the early Roman tradition and are datable to the 1st-3rd centuries. They include Red Sea mollusc shells, Mediterranean coral beads, and stone beads of Eastern Desert or Indian origin. The bead types encountered during this period are small ellipsoid carnelians, short biconical carnelians and amethysts, as well as agate barrels of red or black/brown and white color, the latter also imitated in black and white folded glass. Besides Egyptian monochrome drawn glass beads, gold-in-glass and silver-in-glass specimens are also present, as are wound blue beads with applied stratified eyes.

Analysis of the bead typology also enables a discussion about the proposed chronology of two tombs of this period. The tomb that objects 3 and 4 come from is dated to the 3rd-4th centuries, whereas parallels for stone beads that are included in the bead objects found there point to their being produced some time between the 1st century BC and the 1st century AD. How long were individual beads in use before being threaded together and placed in graves is not possible to ascertain, yet the much earlier dating of a considerable part of the bead types in objects 3 and 4 suggests that an earlier dating of the associated tomb is not improbable.

Similarly, objects 5 and 6 are from a tomb datable to the 3rd-4th centuries, but parallels with known dated bead types suggest that these objects may not have been produced later than the 3rd century. Although generally in line with the dating of the tomb, the timeline of these bead types suggests that a slightly earlier or tighter chronology for the burial is possible.

Objects 7 to 23 (Figures 3-6) are associated with the late Roman period (4th-6th centuries). Whereas beads made of Mediterranean coral and perforated Red Sea shells were also manufactured in earlier times, a number of new types (such as the perforated Mediterranean mollusc shells, a few wooden beads, bone pendants, as well as amber beads most probably of Baltic Sea origin) appear in the archaeological record from this time onward. Large beads of green stone, which was most probably procured in the Eastern Desert, were often imitated in faceted glass.

Drawn and segmented glass and metal-in-glass beads are of oblate and ribbed shapes. Some gold-in-glass double segments are characterized by wide interspaces. Some other new types include cornerless cubes, teardrop pendants with one flat side, so-called "date" beads (with yellow caps) in many variants, as well as striped bichrome bicones. During this period the Indo-Pacific drawn and rounded beads (here green in color), of South Indian/Sri Lankan origin, also make their way into the record. Eye beads made of mosaic glass with yellow centers and radial petals in black and white start being used around this time as well.

A few types, including beads of Baltic Sea amber, beads and pendants of Mediterranean coral, and pendants of marine mollusc shell of both Mediterranean and Red Sea (*Conus taeniatus*) provenience, continued to be used at Matmar and Mostagedda throughout the 6th and 7th centuries (objects 26-40; Figures 6-10). New types that appear during this time include nacre pendants, dentalium beads, large beads of pale amethyst, and long carnelian bicones. The latter, however, are also well known from earlier Nubian and Egyptian assemblages of the 4th-6th centuries (e.g., Then-Obłuska 2018b).

A feature of this period is the abundance of "date" beads, most of which are green with yellow caps. Other types include simple, translucent dark green segmented beads, both drawn and wound, and metal-in-glass beads. Among the latter are a few with translucent golden-yellow layers. Other beads are dark blue cornerless cubes and long cylinders, some faceted ones, and long faceted bicones. A few folded-glass beads are black with a central white band. As for glass pendants, new types are the dark blue irregular teardrops and what is probably a reused Roman phallus pendant.

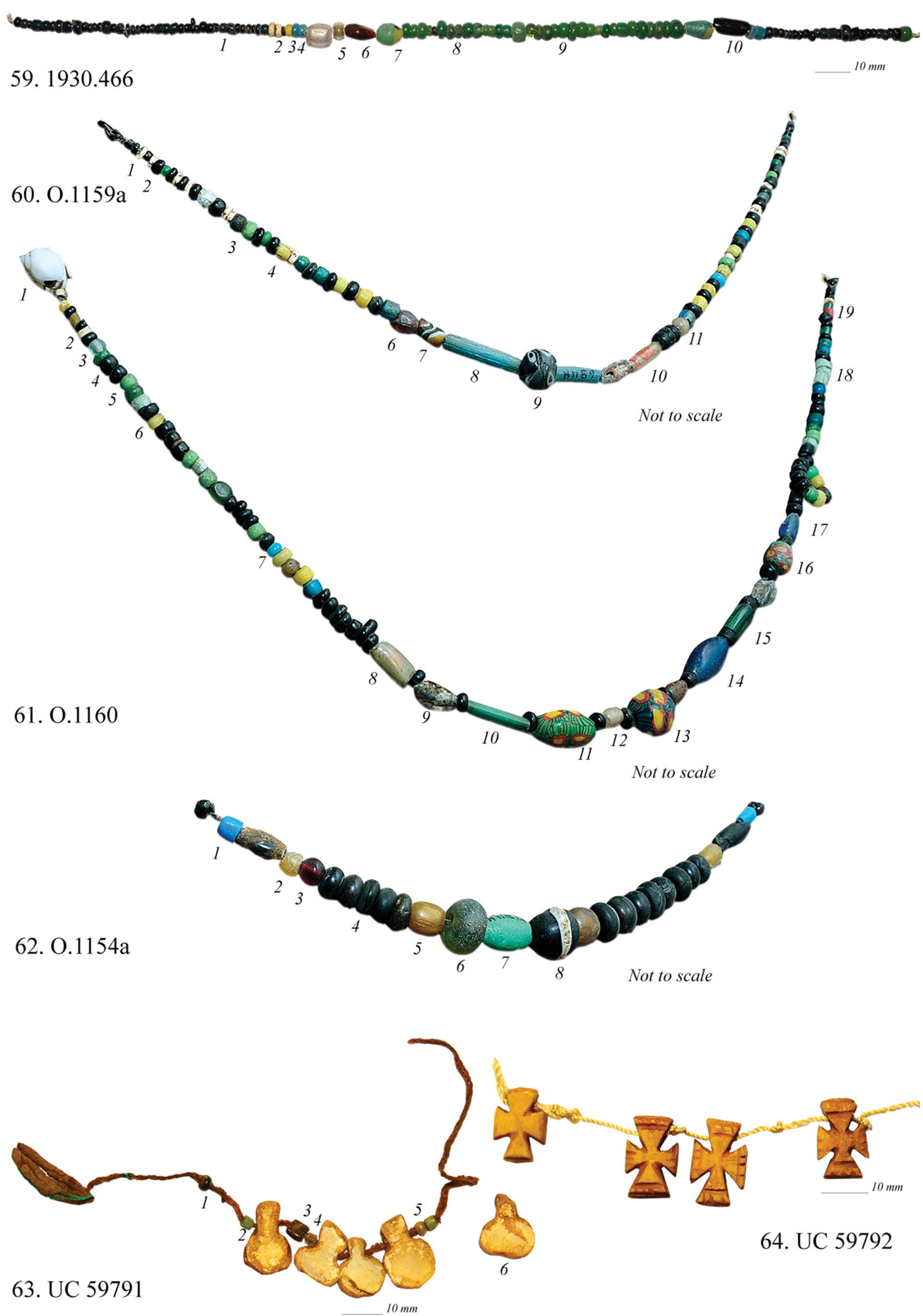

Figure 16. Matmar and Mostagedda objects 59-64, 7th-early 9th centuries; original stringing: 63 (16.60, 61, 62 courtesy of The National Museum, Bloemfontein, South Africa).

Amber and coral beads, mollusc-shell pendants, pale amethyst beads, and faceted long carnelians continued to be used at Matmar and Mostagedda during the 7th and 8th centuries (objects 42-57; Figures 11-15). Notable for this period is the introduction of a diversity of pendants of amber, bone, and wood. Monochrome drawn and wound beads dominate the glass bead assemblage. New types include large beads made of polychrome glass: wound black beads with a trailed white line, beads of striped drawn glass, folded banded glass, and mosaic eye beads. The presence of cross pendants of metal (object 42) and bone (object 48) is also notable.

As in the case of objects 3 and 4, the production timeline of a series of known bead types does not fully agree with the revised tomb chronology. Divergences between the two timelines exist with respect to two objects (nos. 58-59; Figures 15-16) that come from a tomb attributed to the period between the 7th and the beginning of the 9th centuries. Scandinavian and Baltic parallels for types of mosaic eye beads with radial designs included in these objects indicate that these bead types were produced from the mid-8th to the beginning of 9th centuries. This suggests that the tomb more likely dates to the late 8th to mid-9th centuries. A later date is also supported by parallels on site. Object 61, found in a tomb dated to the 8th-early 9th centuries, incorporates a mosaic eye bead design similar to those included in object 58.

Object 62 (Figure 16) was found in a tomb tentatively dated to the 5th-8th centuries. A parallel for a bead type (44.4) suggests a tighter date for the tomb in the 7th or 8th century. Two other objects could not be provenienced nor dated (nos. 63, 64; Figure 16), but several analogous pieces on site hint to a possible chronology. The decontextualized necklace with nacre pendants (no. 63.6) is similar to a group of beads that share the same nacre type as no. 29.7 from a tomb dated to the 6th-7th centuries. Four bone-plaque cross pendants restrung in modern times (no. 64) resemble a bone cross with a different decoration and type of suspension (no. 48.6) from a tomb dated to the 7th-8th centuries.

To conclude, with few exceptions, the recently revised chronological time frame of the Matmar and Mostagedda Ptolemaic to early Arab necropolises largely agrees with the known chronology of bead types found at the two sites, evidenced through the analogous examples discussed above. Judging from the diversity of types, it is likely that the inhabitants who buried their dead at the two sites had access to a wide array of beads and bead materials at local markets. They used an extensive range of types that were traded along the routes of the Nile Valley, and stretched further away along the Mediterranean and Red Sea coasts, toward northern Europe and South Asia.

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ENDNOTES

1. For more information about Brunton's excavation methods, *see* Pleşa (2017b).

2. The results of the radiocarbon dating of 20 textile samples are not yet published, but short references to these may be found in Pleşa (2017a).

3. The British Museum, London (EA) (n=16), The Petrie Museum of Egyptian Archaeology, University College London (UC) (n=17), The Ashmolean Museum, University of Oxford (n=6), The Fitzwilliam Museum, University of Cambridge (E) (n=4), Staatliches Museum für Ägyptischer Kunst, Munich (ÄS) (n=16), and The National Museum, Bloemfontein, South Africa (O) (n=4).

4. Matmar: Tombs 601, 615, 623, 801, 802, 812, 824, 825, 829, 831, 832, 834, 843, 853, 855, 862, 873, 874, 885, 1013, 1027, 1033, 1035, 1038, 1040, 1045, 1053, 1060, 1068, 1080, 1101, 1102, and 1301. Mostagedda: Tombs 573, 574, 576, 577, 588, 1104, possibly 1407, 1411, 1429, 1441, and 1844.

5. Two objects (63: UC 59791, 64: UC 59792) could not be properly redated because they are decontextualized.

6. Many additional bead fragments are not illustrated.

7. Tomb 831 yielded a Theodosian coin (VICTORIA AVGG; Victory I) datable to the last two decades of the 4th century (Brunton 1948:95).

8. Two textiles from Tomb 1013 yielded two radiocarbon dates, one spanning the period from the 2nd decade of

the 5th century to the middle of the 6th century; the other from the middle of the 6th century to the middle of the 7th century (Pleşa 2019b).

9. Such patterned beads are presented together (MET 10.130.3288) with another type having a white center with dark pupil, bordered with a red and yellow ring and radial stripes in translucent dark green and opaque yellow. They are dated to the 8th-9th centuries (Wood 2018: Figure 1 C, H, I) or to the second quarter and middle of the 9th century (Callmer 1997:199, Plate 16, C8, 2003:42, Figure 4.2, C8).

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EVEN MORE ON FRIT-CORE BEADS

Karlis Karklins

This article corrects the dating of a frit-core bead from Quebec reported in 2018, and reports three new find sites, two in North America and one in Europe. One of the American sites was occupied well past the 1560-1610 date range proposed for these beads, while the other is situated well to the south of all the others. The third site is in Rouen, France, where two different types were found with wasters from the production of drawn glass beads.

In the recent *Beads* article, "More on Frit-Core Beads in North America," the authors ascribed the Type 5A specimen recovered from the site of Fort Ville-Marie at Pointe à Callière, Quebec, to its early occupation which began in 1642 (Karklins and Bonneau 2018:58). One of the archaeologists who excavated the bead has since informed me that the specimen – recovered from the upper level of a pit (BjFj-101) – most likely relates to an earlier aboriginal occupation:

> "BjFj-101 has a ^{14}C date of 1600-1615 in a pre-Ville-Marie level, and in an even older level, it has wonderfully preserved remains of garden, a longhouse and four large fireplaces including one with lead shot in it. That level also has a lot of Native pottery and it's not SLI [St. Lawrence Iroquois] – it could be Ontario Huron or New York Iroquois. The pollen stratigraphy dates this level to about 1590-1610. So the frit-core bead fits with that data" (Brad Loewen 2018: pers. comm.).

The revised dating places the Fort Ville-Marie specimen within the expanded 1560-1610 date range proposed for these beads in northeastern North America and is therefore probably not an heirloom as proposed in the 2018 article.

It should, however, be mentioned that a likely heirloom Type 2 frit-core bead (Figure 1) came to light just as the 2018 article was going to press. It was recovered from the Seneca Marsh site in Ontario County, New York, which was occupied from ca. 1650-1670 (Michael Galban 2018: pers. comm.), making it the most recent frit-core bead in the chronological sequence. It joins the Type 2 bead from the Seneca Power House site (ca. 1640-1655) as the only other frit-core bead to fall outside the proposed 1560-1610 range proposed for this bead category (Karklins 2018:58). It is interesting to note that frit-core beads are present at six consecutive Seneca sites occupied over a ca. 100-year period from 1570 to 1670. Almost all the other sites yielding frit-core beads were inhabited during the period from ca. 1580-1600 (Karklins 2016:62). It will be interesting to see if other frit-core beads are recovered from equally late contexts.

Figure 1. Type 2 bead from the Seneca Marsh site (photos: Michael Galban; courtesy of the Rock Foundation, Rochester Museum and Science Center).

Another find of note is an incomplete Type 3 bead (no decoration) uncovered at Mission Santa Catalina de Guale on St. Catherines Island, coastal Georgia. This is way to the south of the main cluster of frit-core beads in the Northeast. The bead was found immediately to the west of a mission-era structure (St. 5) that appears to have been a high-status Guale residence (Blair 2015:90-100). Associated beads and other artifacts suggest it dates to the latter half of the 17th century. There was, however, both a French and a Spanish occupation somewhere in the immediate vicinity of the mission in the 16th century so the bead could conceivably have derived from one or the other (Elliott Blair 2019: pers. comm.).

The bead is somewhat oblong (Figure 2), measuring 7.6 mm in diameter and 8.8 mm in length with a perforation 2.1 mm in diameter. This is in keeping with the Type 3 beads recovered from two sites in Nova Scotia which are 6-7 mm in diameter and 8-11 mm in length (Karklins 2016:60). These two sites are the only others where Type 3 has been encountered. The mission bead is unusual in that the core consists of a crude glass with numerous inclusions unlike the Nova Scotia examples which had cores composed of what appeared to be slightly fused sand (Whitehead 1993:66). The cores of other Type 3 beads consist of fused coarse granules of crushed quartz (cf. Figure 1). The Guale specimen may represent a more refined technique for producing frit-core beads later in the 17th century.

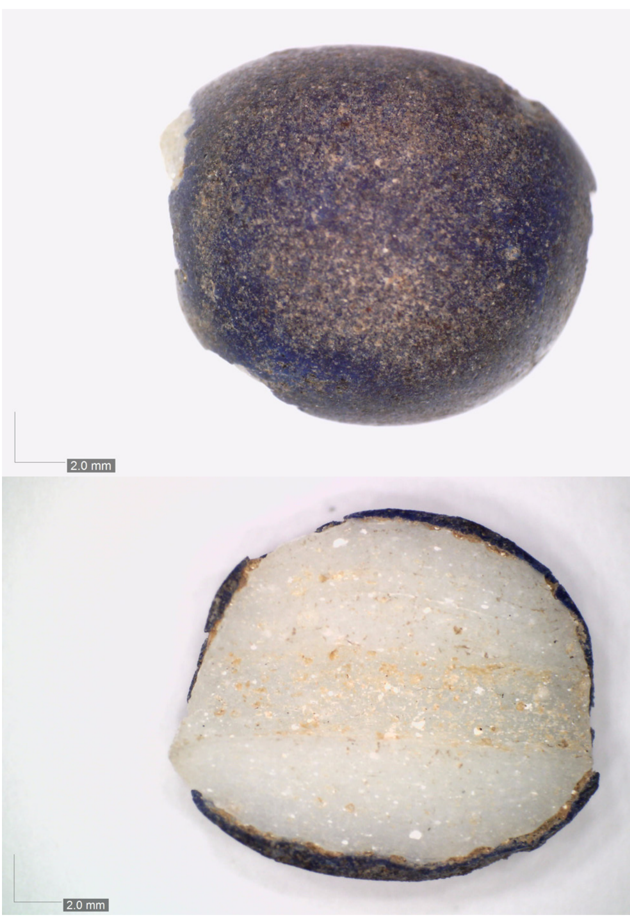

Figure 2. Type 3 specimen from St. Catherines Island, Georgia (photos: Pierce Wright).

Also noteworthy is the presence of two frit-core beads in material collected by Mr. Jacques-Michel Thaurin during street construction in 1869 at the intersection of rue Jeanne-d'Arc and rue du Gros-Horloge in the old section of Rouen, France. Attributed to the beginning of the 17th century, the material is held by the Musée des Antiquités (2014), Rouen; inv. no. 1718.1.2 (D). The first specimen is Type 2 (Figure 3, left) with an oblong dark blue body decorated with four rows of three dots and four longitudinal stripes in white. The other bead is Type 6. It has a round dark blue body encircled by a wavy white line. In each undulation of the line is a floral design composed of 6 light blue dots around a yellow dot (Figure 3, right). Of three known specimens, this is the only one where the colors of the various design elements could be observed. Both beads are slightly malformed and likely represent production rejects.

Figure 3. Type 2 (left) and Type 6 (right) beads from Rouen, France (© Musée-Métropole-Rouen-Normandie; Cliché Yohann Deslandes).

The Rouen specimens were found associated with a variety of drawn glass beads as well as their production tubes and malformed specimens suggestive of local production (Figure 4). This association suggests that frit-core beads were produced at the same shops that also made drawn beads. In the initial article on frit-core beads, it was postulated that France was a likely candidate for their production (Karklins 2016:64). While the presence of two specimens in excavated material in Paris (Turgeon 2001) and another two in the Rouen collection does not positively prove this, it does add to the evidence for this being the case, especially since both specimens from Rouen appear to be production rejects. It is hoped that additional museum, archival, and archaeological research will eventually confirm a French origin for the frit-core beads, with Paris and Rouen among the production centers.

The frit-core beads reported in 2018 and here are summarized in Tables 1 and 2 for ease of reference.

Figure 4. The production tubes and wasters associated with the two Rouen frit-core beads (© Musée-Métropole-Rouen-Normandie; Cliché Yohann Deslandes).

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Table 1. Distribution of Frit-Core Beads in North America (Continued from Karklins 2016).

Site	Location	Bead Type (Quantity)	Date	Cultural Affiliation
Odonak (Karklins 2018:55)	Pierreville, Quebec	Type 6 (1)	1571-1595	Abenaki
Unknown (Karklins 2018:56-57)	Quebec (?)	Type 1 (3) Type 2 (1) Type 7 (2) Type 8 (2)	?	?
Power House (Karklins 2018:55)	Lima, New York	Type 2 (1)	1640-1655	Seneca
Marsh	Ontario County, New York	Type 2 (1)	1650-1670	Seneca
Mission Santa Catalina de Guale	St. Catherines Island, Georgia	Type 3 (1)	1650-1700 (?)	Guale

Table 2. Distribution of Frit-Core Beads in Europe.

Site	Location	Bead Type (Quantity)	Date
Jardins du Carrousel (Turgeon 2001:63)	Paris, France	Type 1 (1), Type ? (1)	1590-1605
Old Rouen (Musée départemental des antiquités 2014)	Rouen, France	Type 2 (1), Type 6 (1)	early 17th century

Musée des Antiquités

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GLASS BEADS FROM IRON AGE AND EARLY MEDIEVAL SCOTLAND

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The dialog surrounding glass beads found in Scottish contexts is limited, particularly those found in Iron Age and Early Medieval contexts. These discussions focus largely on a narrative of diffusion from neighboring groups. This paper, however, examines the beads from a local perspective and finds that they differ significantly from those found in contemporary neighboring contexts. In fact, designs such as the triskele, marbled, and whirl beads do not appear elsewhere in the world and demonstrate significant skill and artistry on the part of local populations within Scotland. Colors also differ from neighboring groups, with deep blues and bright yellows favored over opaque reds and whites. These differences and the skill evident in the creation of these beads provide significant reason to examine the Scottish material in further detail.

INTRODUCTION

Glass beads found in Scotland are rarely studied from a local perspective, particularly those from contexts likely dating to the Iron Age and Early Medieval periods (800 BC-AD 800 for the purposes of this paper). Many who have studied these collections note the significant lack of beads in Scotland compared to neighboring regions and study the beads from a non-local perspective, such as the Irish, Romans, Norse, or Anglo-Saxons (Guido 1978, 1999). Yet, there were most certainly skilled glass beadmakers in Iron Age and Early Medieval Scotland as evidenced by the variety, intricacy, and relative uniqueness of many of the designs. This article serves as the first comprehensive discussion of Iron Age and Early Medieval glass beads in Scotland and hopes to serve as the catalyst for more research into these impressive collections.

While there are many faience and amber beads dating to this period in Scotland, this paper will speak specifically to the glass beads due to space limitations. I will first detail the current state of bead research in Scotland before examining regional distributions of glass bead colors and designs. The question of manufacture is considered briefly. In addition to providing the first published comprehensive study of this material, this paper also argues for further research into the Iron Age and Early Medieval glass bead collections in Scotland from a local perspective. There is much that cannot be explained well through the lens of neighboring groups, and the skill and designs of local craftspeople merits study in their own right.

THE STUDY OF SCOTTISH GLASS BEADS

Our current understanding of Scottish beads stems more from consultation of typologies designed for or focusing on neighboring regions rather than from studies of the Scottish material (Brugmann 2004; Callmer 1977; Guido 1978, 1999; Mannion 2015). Classification of glass beads from Scottish contexts using these typologies has helped our understanding of the Scottish assemblages significantly, but the lack of any systematic and comprehensive study or publication of Scottish beads from a local perspective has minimized acknowledgement and discussion of the ingenuity and creativity of the local Iron Age and Early Medieval glass bead industry.

Trends in bead studies in Britain coupled with theoretical discourses of acculturation, diffusion, and intercultural interaction also significantly influence our current understanding of Scottish beads. Beads were highly documented in Britain during the 19th century, and many beads in museum collections were donated around this time. Most published information about beads in Scotland, particularly from the Iron Age and Early Medieval periods, also dates to the 19th and early 20th centuries (Black 1891; Callander 1911; Matthewson 1877; Maxwell 1889). Much of this literature also pre-dates Beck's (1928) publication of a systematic method for documenting and identifying beads in the archaeological record.

The literature on glass beads in Scotland prior to the Second World War is entirely documentary in nature and often comprises lists of objects purchased by or donated to the National Museum of Antiquaries (now the National Museum of Scotland). Guido published her influential work on beads in Roman and Iron Age Britain in 1978, which contained the first lengthy account of glass beads in Scotland. It was also heavily influenced by contemporary discussions of diffusion and acculturation (Foster 1960). Beads in Scottish contexts were generally assumed by Guido to be trade items, and the discussion clearly favors Continental or English origins for at least the design of most beads if not the beads themselves (Guido 1978:85-89). She often suggests that the Scottish "tribesmen" were incapable of making high-quality objects, and there is frequent discussion of the "poor quality" of examples from Scottish contexts (Guido 1978:85). While she does note the possibility that craftspeople in Scotland may have been able to obtain certain colors and create certain designs themselves and that they may have even done so intentionally, the general narrative of the book is that the technologically superior glass objects of what is now England and the Continent found their way north to Scotland to be imitated (often poorly) by the craftspeople there. Guido (1978) is currently the only published catalog of glass beads in Scotland for the Iron Age.

Two other major works on beads in Britain, both on Anglo-Saxon assemblages, are Brugmann (2004) and Guido (1999). These, plus Guido's (1978) volume, form the primary comparative texts used in Scottish archaeology to understand our own bead assemblages, along with Callmer's (1977) tome of Norse period beads in Scandinavian and, more recently, Mannion's (2015) catalog of much of the Early Medieval Irish material. There is no currently published catalog of Scottish Early Medieval glass bead assemblages. Given the extent to which Scottish archaeologists have had to rely on typologies and catalogs created for use in neighboring regions, it is little wonder that the narrative of objects and designs originating elsewhere and diffusing or travelling to Scotland has become commonplace.

There are, however, several published and unpublished studies of Scottish beads currently available in the literature. Henderson (1991:125) has studied small yellow annular beads at length and identified a clear chemical distinction between the glass found in Scottish contexts such as Culbin Sands, and those found further south, such as those at Meare. Bertini et al. (2011, 2014) have analyzed large numbers of objects referred to here as triskele (triple spiral) beads and whirl beads (Guido 1978, Classes 13 and 14) and found significant evidence for local manufacture using glass waste and cullet. Guido (2000) conducted a study of glass beads found at Dunadd and concluded all were either Irish, Norse, or Continental in origin. Hoffman's (2008) unpublished report on beads in the Perth Museum provides valuable information about the context of the objects where possible and its significance in wider interpretations. Blackwell and Kirk (2015) have presented strong arguments cautioning against the common practice of assuming glass beads are ancient when recovered as stray finds in Scotland and have reclassified numerous beads as post-medieval instead of Anglo-Saxon in origin. Finally, Foulds (2017) has critically evaluated the use of Guido's typology for Iron Age glass beads found in northeastern Scotland, and created a new typology for use in the region, suggesting possible connections between the designs incorporated into the beads and local identity. In addition, there are several unpublished theses concerning Scottish beads: Bertini (2012) conducted an extensive study of the triskele and whirl beads in northeastern Scotland, Blackwell (2018) cataloged significant numbers of Anglo-Saxon beads and reclassified many as post-medieval, and Christie (2019) compared the bubble concentrations and responses to near-infrared and near-ultraviolet light of many Iron Age and Early Medieval beads to determine possible differences among otherwise visually similar objects. While each of these studies is valuable in moving discussions of Scottish beads forward, a published comprehensive study of the objects across Scotland is still lacking.

Within Scotland, there are over 1000 glass beads from roughly 150 sites likely dating to the Iron Age and Early Medieval periods (Figure 1). Culbin Sands on the Moray

Figure 1. Locations of Iron Age and Early Medieval glass bead finds in Scotland, sized in proportion to the number of objects found at a site (all images by the author).

Coast has over 500 glass beads, while Glenluce Sands (Luce Sands), Newstead, and Traprain Law in the south all have between 30 and 50 each. The other sites have fewer than 25 glass beads each, with roughly 60% yielding only one bead. These are relatively low counts compared to other regions at this time; Anglo-Saxon sites average roughly 140 glass beads each while Scottish sites average only about 5 or 6 (Brugmann 2004:112-117; Christie 2019:36; Guido 1999). Most Anglo-Saxon beads come from furnished burial contexts, however, which do not appear in the Scottish Iron Age or Early Medieval periods. If the Anglo-Saxon assemblages were limited to only those objects found in non-burial contexts, they would likely have similar averages to contemporary Scottish contexts.

The variety and ingenuity of Scottish glass beads are impressive. Many beads employ design features and manufacturing techniques not often seen elsewhere, such as the fairly common triskele bead (Guido 1978, Class 13) or those in which an opaque glass has been marbled into a translucent base to create a tri-colored bead using only two colors of glass. Contrary to the common discussion of Scottish beads as being Anglo-Saxon, Norse, Irish, or Roman in design and often origin (Guido 1978, 1999), Scottish beads actually exhibit colors, designs, and sometimes manufacturing techniques which significantly differ from those employed by neighboring groups often credited with their origin.

This paper aims to illustrate the significant differences between the Scottish assemblages and those of their neighbors, as well as the value of studying the material from a local perspective. It also provides a preliminary list of Scottish sites with glass beads found in contexts likely dating to the Iron Age and Early Medieval periods (Appendix A). While the degree of information presented is limited due to space constraints, this article hopes to serve as the beginning of what will become a lengthier conversation on glass beads in Iron Age and Early Medieval Scotland. The beads discussed here comprise most of the collections at the National Museum of Scotland, the Hunterian Museum and Art Gallery at the University of Glasgow, the Marischal Museum at the University of Aberdeen, the Kilmartin House Museum, the Iona Abbey Museum, and collections housed at the University of Glasgow.

This study is not based on a complete catalog of glass beads in Scotland from the Iron Age and Early Medieval periods. Many collections are spread across the nation and many finds from excavations are published in grey literature. While Scotland is excellent at providing access to archaeological information, compiling everything from disparate sources takes time. This project is therefore a work in progress and will continue to be so for many years to come. The lack of a comprehensive catalog of Iron Age and Early Medieval glass beads in Scotland has led to a lack of scholarship on the subject and a general narrative that these objects came from elsewhere, with relatively little agency awarded to the local populations at the time. This article offers a different perspective on Scottish glass beads and provides a foundation upon which future studies can be built.

All site information presented here and in the accompanying list comes from the associated museum records, available publications, and the data provided by Historic Environment Scotland's (2019) CANMORE database. Many beads lack contextual information because they are either stray finds or the data have since been lost. In fact, over 90% of the Iron Age and Early Medieval beads in Scotland lack such information and over 25% of sites with glass beads do not have any known geographical coordinates. This leads to significant difficulties in discussing chronological or spatial relationships between objects because the most information associated with many of these objects is the site in which they were found. Most sites with beads are also complex multiphase sites often spanning the Iron Age to the High Medieval periods and beyond, making it impossible to know from which phase a stray find may have come. Coupled with the longevity of many glass bead styles and designs, it is difficult to discuss chronological distributions of beads in Iron Age or Early Medieval Scotland. Consequently, discussions of social practices surrounding the objects, their possible symbolism, or any other scholarship that requires knowledge of how, where, and when an object was used remain difficult.

THE POSSIBLE ISSUE OF CULBIN SANDS

Additionally, there is a possible issue with the site of Culbin Sands on the Moray coast. The site has over 530 documented glass beads, which is significantly larger than the site average of five or six for all other sites with glass beads in Scotland during the Iron Age and Early Medieval periods. All the beads are stray finds from wind blows within a major sand dune complex with no associated contextual information.

There are two main problems with the beads from Culbin Sands. The first is that it is perhaps the best-known site in Scotland for glass beads of the Iron Age or Early Medieval periods. As such, it is entirely possible that individuals donating or accessioning beads to museum collections had been told the objects were from Culbin

Sands without confirming they had originated from that site. There is no specific research into whether this phenomenon has occurred in the United Kingdom, but it plagues many bead sites in Asia, particularly Ban Chiang in northern Thailand. Scholars and tourists alike have found thousands of tiny glass seed beads there, so much so that vendors often refer to beads of this type as Ban Chiang beads. Now, when individuals donate strings of beads to museums or speak to archaeologists about their beads, they often say the beads came from Ban Chiang because that is what vendors told them. Instead, these beads often come from dozens of other sites in Thailand or are modern replicas. It is possible for such a phenomenon to have occurred with Culbin Sands. The Society of Antiquaries published widely on the site several times when most of the glass beads from Culbin Sands were donated to the National Museum of Antiquaries (Black 1891; Callander 1911; Linton 1876; Matthewson 1877). Since many of the beads from Culbin Sands are stray finds, it would not be surprising for at least some of them to be misattributed to the site.

The second issue with Culbin Sands is the lack of contextual information for the beads. Most were recovered in the 1800s and donated to the National Museum of Antiquaries shortly afterwards. The museum strung many of the monochrome beads together, organizing strings by color rather than by objects that may have been found together. We therefore have one string of cobalt-blue beads, one of blue-green beads, one of green, two of yellow, one of black or deep purple, three of clear glass of which two sets have what appears to be seaweed clinging to them, and one of a milky-white color. Of these strings, the three clear and one milky-white string are likely post-medieval objects, given the quality and coloring of the glass. It would not be surprising to find certain other beads on these strings that are also either post-medieval or modern, but the other colors are more difficult to eliminate based on the glass alone.

These issues do not in any way negate the data associated with the site, but they do call into question the degree to which Culbin Sands has yielded such a large assemblage. Beads said to come from Culbin Sands do still likely originate from the northeast, however, and likely from near Culbin Sands if not the site itself. It is also possible that several necklaces or collections of beads were lost on the beach at the site, but this is less likely; if a necklace of precious materials breaks, for example, the owner tends to try to recover the objects as best he or she can. While there are concerns about their specific provenience, the beads from Culbin Sands are still included in this study; we cannot know for certain that they all came from the site, but neither can we be certain they did not.

SCOTTISH GLASS BEADS

The two most significant characteristics available to examine the Scottish material, given the general lack of contextual information, are color and decoration. Most beads (roughly 75%) are monochrome, making color the more prevalent characteristic of the two. Yet, these characteristics alone demonstrate significant differences between beads found in Iron Age and Early Medieval contexts in Scotland and those found in contemporary contexts in neighboring regions. The geographical distribution of the beads also indicates regional differences within what is now Scotland, suggesting regional differences in cultural preference, trade routes, and manufacture.

Regional Color Preferences

Discussions of color in beads has always been difficult due to the tendency of glass to change color depending on past sunlight exposure and also the light in which it is being viewed. Color is also subjective; where one person sees a blue and black dress another might see white and gold, depending on the lighting. Some suggest using the Munsell Books of Color while others rely on somewhat subjective names like “corn yellow” or “sea-green.” Yet, subjective designations like “sea-green” could apply to a range of colors; the sea can be any number of different greens depending on location and weather. On the other hand, highly specific color descriptions like Munsell are problematic because glass changes color in different light and because the differences between categories are often indistinguishable. Most importantly, Munsell colors are denoted as codes. Many institutions and researchers do not have access to the Munsell Books of Color, particularly that designated for beads, and therefore cannot use the system.

Here, I have used the most basic color terms possible while still maintaining a level of functionality. Colors are referred to as red, orange, yellow, green, blue, purple, black, grey or white, with light and dark applied as necessary. If possible, I distinguish between cobalt blues or dark blues and other types of blue due to differences in the likely colorant used in the glass. I also note naturally colored glasses (those made without added colorants) where possible. All colors are noted as they appear visually in a museum context under fluorescent lighting, with discussions of differences to the actual color of the glass occurring where necessary. Black beads in Scotland are often made of black glass, for example, but are equally often made of very dark translucent greens, purples, pinks, or blues.

Of the roughly 1000 glass beads examined for which color information is available, 37% are visually blue and 32% visually yellow in color while a further 11% are visually black (Figure 2). Additionally, most decorated beads in Scotland consist of yellow or white designs on a cobalt-blue or black background. The blues tend to be translucent while the yellows are opaque. Accounting for natural versus intentional colors does not change the results terribly, save

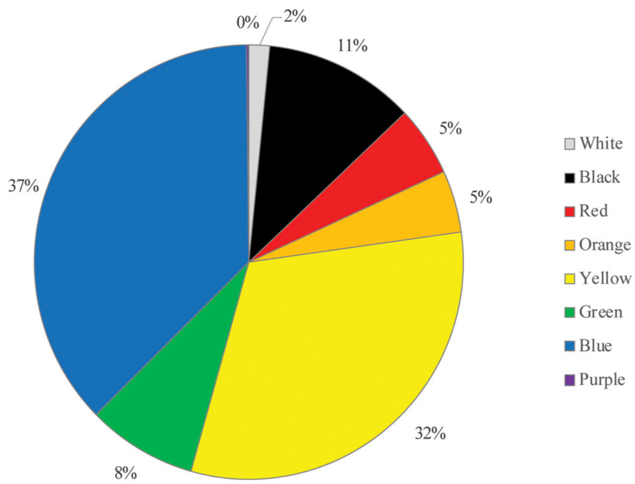

Figure 2. The proportion of general base colors of glass beads in Iron Age and Early Medieval Scottish contexts.

that roughly 7% of glass beads in Scotland are naturally colored (Figure 3). Interestingly, the natural colors are all relatively well-represented with a possible slight preference for natural blues and browns over the natural greens, yellows, and ambers. It might be proposed that the naturally colored

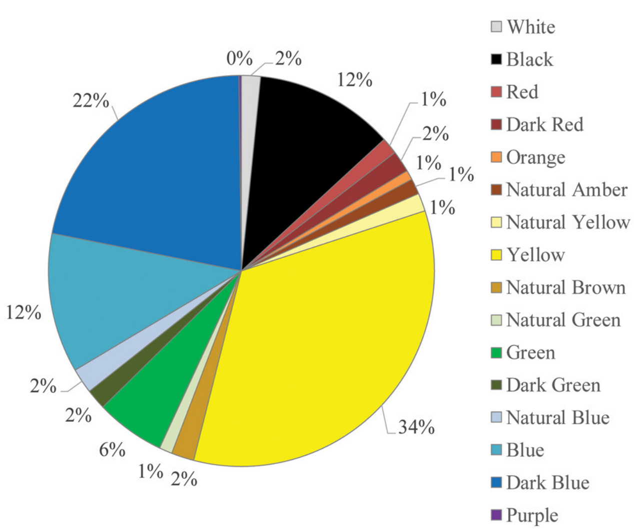

Figure 3. The proportion of base colors of glass beads in Iron Age and Early Medieval Scottish contexts, including natural colors.

beads are the result of using cullet derived from imported naturally colored glass vessels which were common in Scotland (Campbell 2007:55). While this may be the case, the preference for different natural colors differs between the imported vessels and the beads themselves. Where pale yellows and greens are clearly favored in naturally colored vessel sherds, the distribution of natural colors among glass beads is significantly more uniform (Figure 4). This pattern may be due to a lack of ability to separate the Iron Age beads from the Early Medieval ones; if we could, we might find similar natural color preference in Early Medieval beads as we do in Early Medieval glass vessels. Alternatively, it is possible that there was a cultural preference for specific colors of naturally colored glass vessels that did not apply to beads.

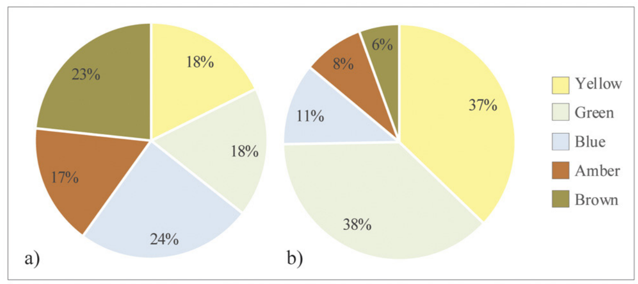

Figure 4. Comparison between proportions of natural colors in Iron Age and Early Medieval Scottish glass beads (a) and Early Medieval glass vessel imports to Scottish sites (b) (after Campbell 2007).

Among intentionally colored blue beads, it is generally important to distinguish between those likely colored with cobalt and those likely colored with copper by separating the dark or cobalt-blue objects from other blues. The cobalt blues dominate the Scottish assemblages of blue glass beads (n=218, 61% of blue beads) compared to other intentional blues (n=116, 33% of blue beads). Seventy-four objects (21% of blue beads) are considered blue-green and likely colored with copper while 21 objects (6% of blue beads) are naturally colored blues. The other 12% of intentionally colored blue beads could be colored with either cobalt or copper, as they fall in the middle range of the spectrum. Norse assemblages, particularly in Scotland, tend to favor cobalt blues, but the data presented here do not currently take the Norse assemblages into consideration. It would appear, then, that cobalt blues were favored in Scotland prior to Norse arrival and that a cobalt-blue bead does not necessarily signify a Norse assemblage.

Yellow beads are almost always opaque bright yellow (n=341, 91% of all yellows) while a few dozen are naturally colored pale yellows and browns (15 and 19 objects, respectively). While there are roughly 200 bright-yellow glass beads from the potentially problematic site of Culbin Sands, these beads appear no different than other examples from more secure contexts. Additionally, removing them does not change the data much; 78% are still opaque bright yellow. Henderson (1991:125) has suggested local manufacture for many of these beads due to chemical differences between the yellow glass found in beads from Scottish contexts and those found in contexts further south.

Black beads are rather widespread, but yield interesting patterns when beads that are made of black glass are separated from those made of glass that appears black but is dark green, blue, purple, or pink in reality. Roughly 54% of black glass beads are made from opaque black glass while 45% are only visually black. The highest concentration of truly black glass beads appears in the northeast, but seem to be more geographically widespread in the southeast (Figure 5). While no beads from Argyll or the western isles included in this study are made of truly black glass, visually black glass appears concentrated in the northeast, Argyll, and the western highlands and islands. This could indicate separate trade routes or manufacturing techniques for both types, with the Atlantic trade routes focusing on visually black glass while the continental side focused on truly black glass. Alternatively, it could suggest chronological differences given the tendency for probably Iron Age glass beads to be visually black rather than truly black. A significant question to answer is whether it was possible in the Iron Age or Early Medieval periods to know that visually black glass was, in fact, some other color by holding it up to a flame or looking through it in bright sunlight. If so, it is possible that these objects were made this way intentionally to take advantage of the color-changing properties of the glass.

Green beads are also worth discussion here as there are significant numbers of bright apple-green beads at several sites in Scotland along with several transparent dark green beads. In general, intentionally green beads are concentrated in the southeast (Figure 6). The dark green beads tend to be

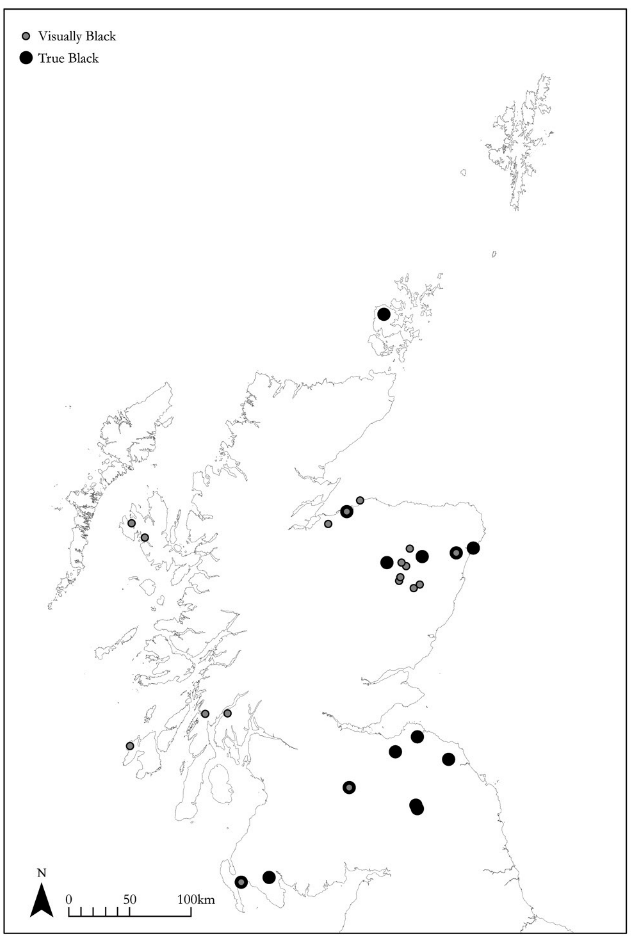

Figure 5. Sites with visually black versus truly black glass beads in Iron Age and Early Medieval Scotland.

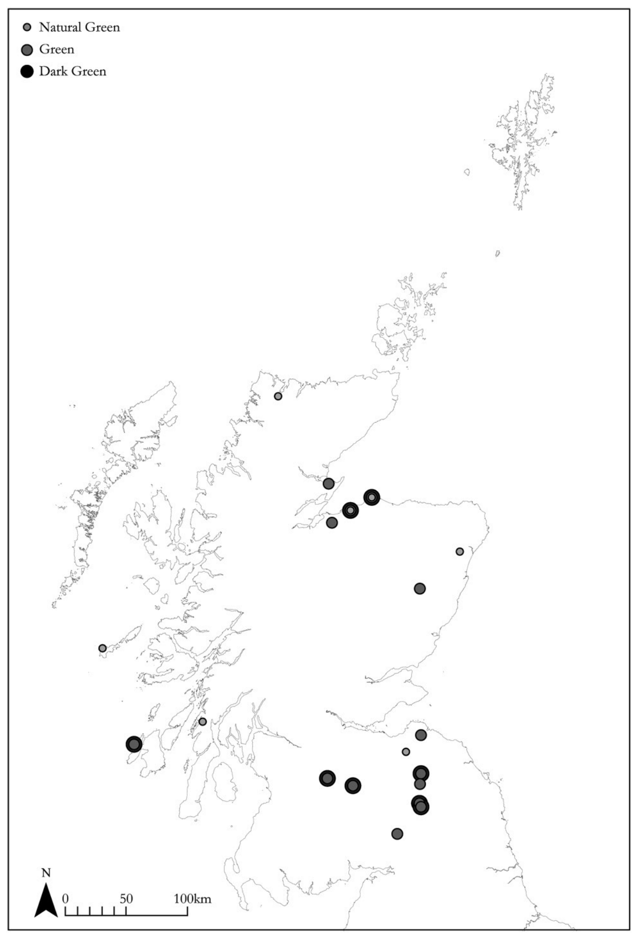

Figure 6. Sites with natural green, dark green, and other intentionally green beads in Iron Age and Early Medieval Scotland.

associated with known Iron Age sites, including Newstead and Traprain Law. Naturally colored green beads have similar associations, though in different regions of the country. The brighter greens are more likely associated with later sites, and there are several that appear on Norse-period sites not included in this paper. Naturally green beads appear only at largely coastal sites; Mieklelaw Field is the furthest inland at 15 km from the shore. This could suggest that naturally green glass, or at least that used for beads, was largely a coastal import. Such patterns are difficult to confirm, however, given that there are only eight objects coming from sites with known geographical coordinates.

These varied distributions of glass bead colors, intentional or natural, suggest that the different regions of Scotland had different preferences for beads at different times, and that those preferences also differed from their neighbors in what is now the rest of Britain, Ireland, and Scandinavia. For example, Anglo-Saxon sites often have large quantities of opaque red or orange glass, sometimes referred to as terracotta (Guido 1999:59). By contrast, red and orange beads make up fewer than 5% of glass beads in Scotland (Figure 4). White beads are also scarce, forming only 2% of Scottish material. These are often popular in both Scandinavian and Anglo-Saxon assemblages. While it is possible that many of the beads in Scotland are Iron Age and therefore earlier than the subjects of many bead typologies of the neighboring areas, many of the beads in this database come from known or probable Early Medieval or multi-phase sites. Given the evidence of differing trade routes for imported glass vessels in the Early Medieval period (Campbell 2007; Huggett 1988) and the clear differences in color preferences between Scottish beads and those of their neighbors, it is likely that glass beads and possibly the materials used to make them traveled along different trade routes. It is also likely that different regions in Scotland differed in their bead preferences, as evidenced by color choices and, most clearly, by choices in decorated bead styles.

Regional Decorative/Style Preferences and Innovation

There are three bead styles that are relatively unique to Scotland: marbled, triskele (Guido 1978, Class 13), and whirl (Guido 1978, Class 14). There are possible parallels for the triskele bead but they are often tenuous at best. To my knowledge, there are no parallels for either the marbled or whirl beads during the Iron Age and Early Medieval periods in neighboring regions. Annular opaque yellow beads and annular translucent cobalt-blue beads also warrant discussion due to differences in their distribution within Scotland. Eye, swag, and reticella beads are more difficult to discuss due to their smaller numbers across Scotland.

Marbled Beads

The first of the seemingly Scottish decorated types is quite rare, with only three or four known examples. It is possible they came from elsewhere, but to my knowledge there are no other examples, particularly from contexts in the rest of Britain, Ireland, or Scandinavia. These beads are spherical with a translucent ground and opaque marbled design of a color that, when it overlaps with the translucent base, creates a tri-color design using only two colors of glass (Figure 7).

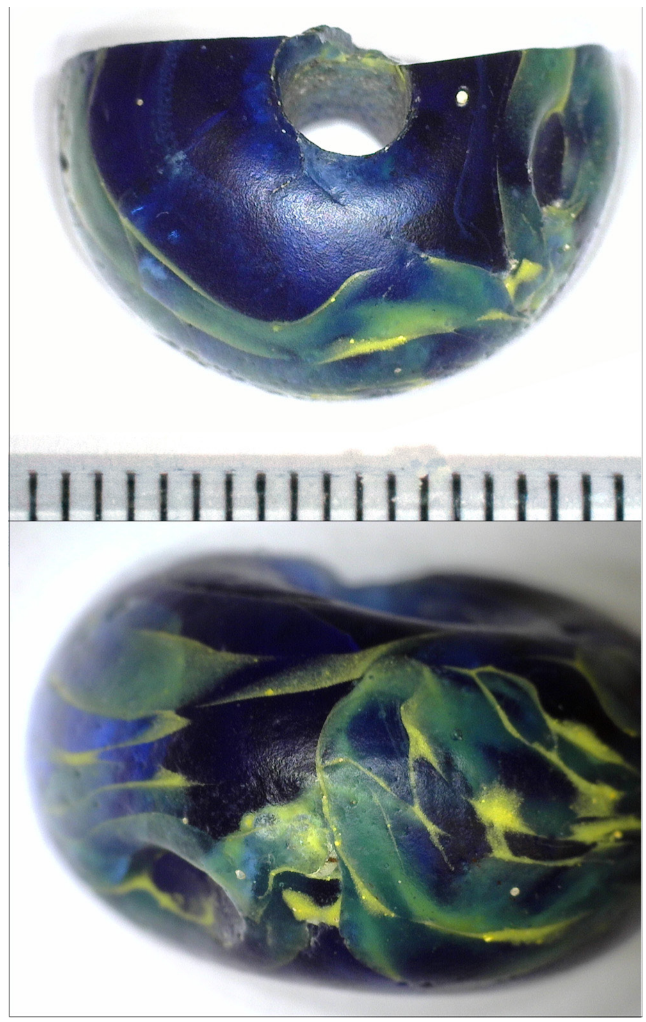

Figure 7. Marbled bead from Culbin Sands in Moray (X.BIB.15; courtesy of National Museums Scotland).

There are two definite examples from Scottish contexts: one from Craigsfordmains in the Scottish Borders and one from Culbin Sands on the Moray Coast. Both have cobalt-blue bodies, but the bead from Craigsfordmains marbles red into the glass to create a red, purple, and blue design, while the bead from Culbin Sands marbles in yellow to create a yellow, green, and blue configuration. There is a third possible example from Dunadd, based on descriptions by Guido (2000:176): an annular dark blue bead with irregular yellow-green streaks made from marvered trails of opaque yellow glass. Another possible example is from Culbin Sands, but this has a natural yellow body with opaque yellow marbled in, thereby creating just a two-color design.

It is possible that this type mimics marbled Roman glass which often incorporates a white or lightly colored trail into a translucent ground. But they are the only examples of beads using the technique of which I am aware and also the only examples from this period that do so to specifically create three colors from two colors of glass.

The unique nature of the object and the use of very common Scottish colors (cobalt blue, and yellow) suggest these beads were made in Scotland. If so, they demonstrate significant skill in glassworking and an impressive understanding of the material, its reactions to light, and basic color theory. Given the prevalence of other bead types specific to Scotland found in Iron Age contexts, there is significant reason to believe the skill and knowledge required to make these objects already existed in this period.

Triskele Beads

One important bead type found in Scotland is what I refer to as a triskele bead (Figure 8, a-d). These are truncated triangular glass beads, generally with dark grounds. Three yellow spirals, one centered on each flattened corner (or sometimes edge) of the triangle, connect on one side of the perforation of the bead to form a three-dimensional or pseudo-three-dimensional representation of a triskele (Bertini et al. 2011:2751) which is a familiar Iron Age Celtic design (Figure 8, e). The identification of this pattern as a triskele supports Foulds's (2014:236) suggestion that the design was more important than the ground of the bead. These beads are concentrated in northeastern Scotland, predominantly in Aberdeenshire (Figure 9), demonstrating differences in bead preference between regions of Scotland.

The triskele style of bead is not included in typologies outside Britain and Ireland, including those by Beck (1928) and van der Sleen (1973). Beck (1920:45, 64) does show a triangular stratified eye bead from Cumae and a Villanovan triangular spiral-eye bead from Italy, but these beads differ from triskele beads in that a) in the case of the stratified

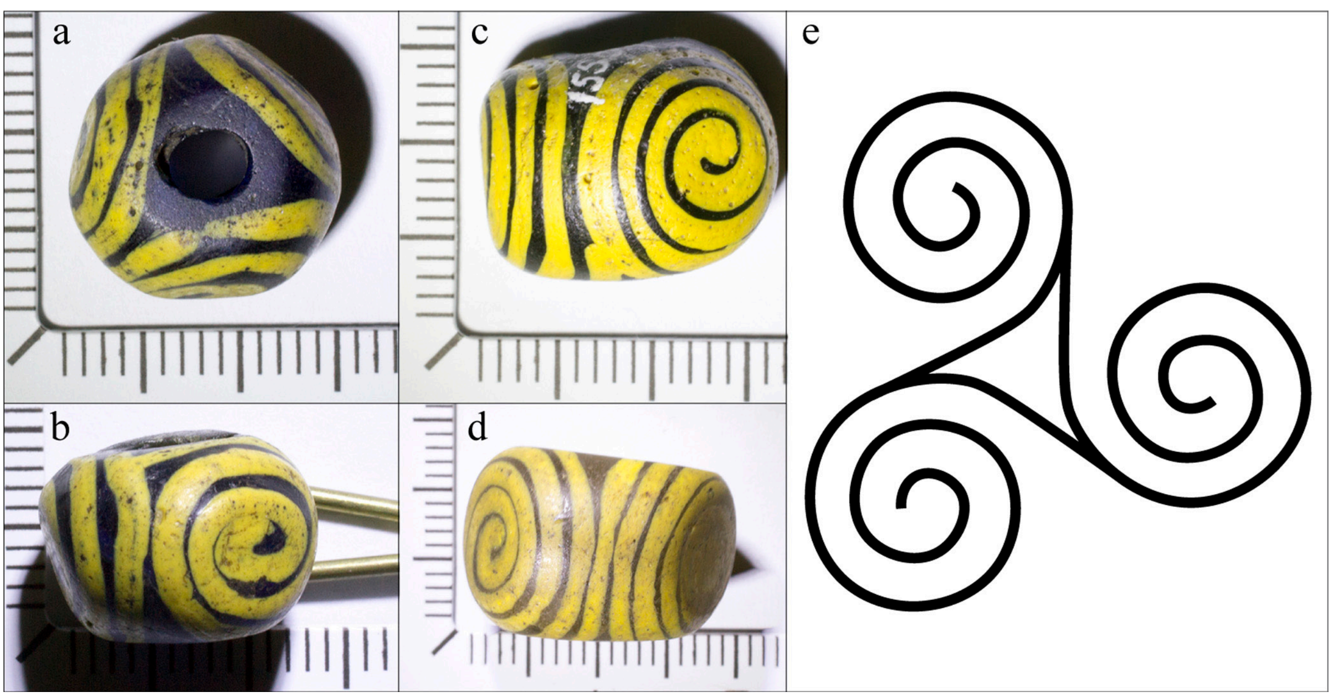

Figure 8. Triskele beads from an unknown site (a, b; ABDUA 15541), Culbin Sands in Moray (c; ABDUA 15507), and Scotston in Aberdeenshire (d; ABDUA 15515) in comparison to a typical triskele design (e) (© University of Aberdeen).

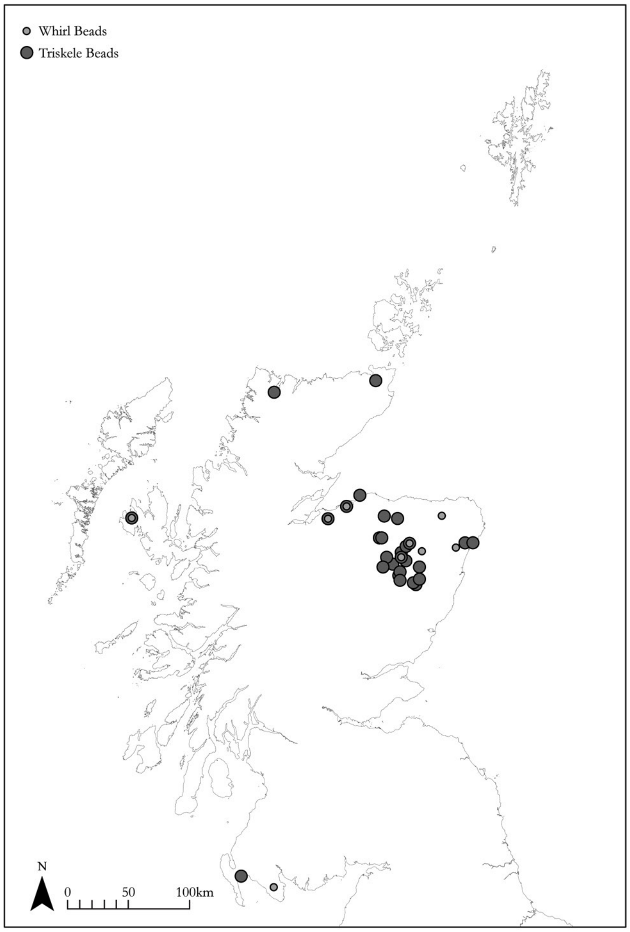

Figure 9. Locations of triskele and whirl beads, showing concentrations in northeastern Scotland.

eye bead, the decoration consists of rings rather than spirals and b) that in both designs, the outer edges of each "eye" or spiral do not touch those of another. Other examples of spiral motifs on beads generally do not cover the entire ground of the object and often include varying numbers of spirals rather than specifically three.

Guido (1978:79) identifies a similar type as Meare spiral beads (Class 10), named such because they were found at the Iron Age village of Meare in Somerset. She identifies the Scottish beads (Class 13) as poor imitations of the Meare beads (Guido 1978:85). The Meare beads also have three evenly spaced spirals, but they differ significantly from triskele beads. First, the body of the bead is always a natural pale-yellow rather than dark blues or blacks and the bead is generally spherical rather than a truncated triangular one. According to Guido's (1978:79) descriptions, the bead's spirals also do not seem to connect as they do in the triskele beads. There are Irish examples with connecting spirals dating to the early medieval period (Mannion 2015:25), but they have a natural pale-yellow rather than a dark ground. These beads also vary from two to three spirals, rather than specifically three, and are spherical rather than truncated triangular in shape (Mannion 2015:25-26). Additionally, while the designs between triskele, Irish, and Meare spiral beads certainly have similarities, the Scottish objects often have no or relatively little contextual information and rarely come from securely dated contexts. Consequently, the triskele beads differ significantly from similar beads found elsewhere and cannot necessarily be described as being earlier or later than another style for the pre-Roman Iron Age.

Perhaps the most interesting element of triskele beads is the dark ground on which the spirals have been created. Most are translucent and appear to the naked eye as being either very dark blue or black, though there are some that are visibly dark green or amber colored. Consequently, the beads appear relatively uniform when viewed in normal light. If held up to a light, however, these objects turn blue, green, purple, orange, or even magenta in color. Many of these changes are visible if the bead is held up to sunlight. While we cannot know for certain, it is possible that those using these beads in the past were aware of this visual change when backlit and that this was an intentional element of their design. Given the nuanced interplay of color and light seen in the marbled beads discussed above, such a design feature would not be outside the realm of possibility.

Whirl Beads

Another bead type specific to Scotland is what I term whirl beads (Guido 1978, Class 14) to distinguish them from spiral beads. These are relatively large annular beads (over 10 mm in diameter) with at least one spiral design emanating from one end of the perforation and circling the bead until it reaches the opposite end (Figure 10). There are three primary whirl styles: 1) one or more shallow-grade whirls that fully encircle the bead two or more times before reaching the other end (Figure 10, a); 2) one or more steep-grade whirls that fully circle the bead only once at most before reaching the other end (Figure 10, b); and 3) a series of wisps that form a vague whirl, circling the bead once or twice before reaching the other end (Figure 10, c). Regardless of their form, the whirls are always opaque and usually yellow, brown, white, or blue. Many of these beads have reticella whirls or something similar of yellow and brown or yellow and blue glass. Like the triskele beads, the

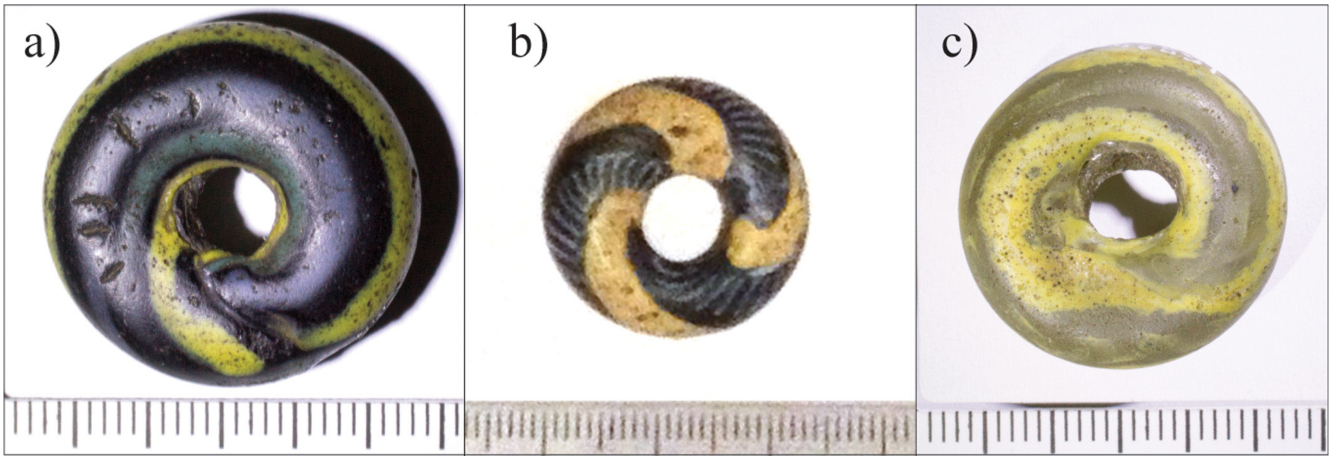

Figure 10. Whirl bead types from Aberdeenshire: a) type 1 from Mill of Gellan (ABDUA 15539; © University of Aberdeen); b) type 2 from an unknown site (X.FJ.118; courtesy of National Museums Scotland); and c) type 3 from Banff (ABDUA 15526; © University of Aberdeen).

body of the bead is often a dark color, usually opaque black or a translucent very dark blue, green, brown, or purple.

Given their differences in size, the tightness of the whirl, the number and color of the whirls, and the color of the core, no two whirl beads are the same. Like the triskele beads, they are concentrated in northeastern Scotland, though there are several examples in the western isles (Figure 9). There is the suggestion that these and the triskele beads were made in the same region, particularly given the lack of similar examples in neighboring regions (Guido 1978:88). They have been found in association with triskele beads in many cases and some are associated with Roman finds or in contexts contemporary with Iron Age brochs, suggesting they date to the same period.

Small Wound Annular Beads

Two other common bead types in Scotland are the small annular translucent cobalt-blue beads (Figure 11) and the small annular opaque yellow beads found so often elsewhere in Britain and Ireland. The yellow beads are often cited as being Iron Age due to their association with Iron Age sites and their description as Iron Age in Guido's (1978:73) typology. Yet, given the lack of secure contextual information for most beads in Scotland, the relative ease with which such beads could be made and the longevity of the wound annular style of bead, it is likely these beads date to more than just the Iron Age.

Yellow annular beads are concentrated at five sites: Airyolland Crannog (14), Culbin Sands (202), Castlehill (8), Glenluce Sands (9), and Traprain Law (12). Other sites

Figure 11. A cobalt-blue annular bead from Ugadale in Argyll (CAPTM 0221.02; courtesy of the Kilmartin House Museum).

tend to have between one and three, but most yellow annular beads in Scotland have been found at Culbin Sands. Such a concentration is not particularly surprising, given the prevalence of yellow in polychrome beads in the region. In fact, their high numbers in the northeast only emphasize the importance of yellow glass there.

There are also concentrations of yellow annular beads in the western isles and in southwestern Scotland along the coast. Philiphaugh is the only site with annular yellow beads in this database that lies further than 10 km inland, suggesting these beads – or at least the glass used to make them – may have come to Scotland through maritime trade routes. According to Guido (1978:75), similar examples found in Wales and Cornwall often come from inland sites, including roughly 50 examples from Meare in Somerset. While this does indicate a possible connection between Meare and Scotland, the number of objects in Scotland far surpasses those found further south and they are found at a larger number of sites. The numbers alone indicate a stronger preference for this style in Iron Age contexts in Scotland. They might even suggest these beads came to Wales and Cornwall from or via Scotland, but using pure object counts for such interpretations is problematic, especially given the lack of secure contextual information for beads in Scotland.

The dark blue annular beads are more widespread, with concentration in the northeast and the southeast. Concentrations again are high at Culbin Sands (23), Glenluce Sands (11), and Traprain Law (14) with other sites having between one and three. These are suggested by Guido (1978:67-68) as being pre-Roman and possibly early medieval, and she notes that while they are not absent at Roman sites, they are often more common in non-native contexts. This matches the data in Scotland. There are significant numbers of glass beads at Newstead which has the largest glass bead assemblage from a Roman site in Scotland, but there are very few dark blue annular beads. There are, however, 14 examples of dark blue annular beads from Traprain Law, an Iron Age hillfort 44 km from Newstead which was inhabited both before and after Newstead's occupation. It seems, then, that the annular cobalt-blue beads were preferred by locals rather than the Romans. This preference for cobalt-blue annular beads also matches the trend preferring cobalt blue as a base color for polychrome beads.

Interestingly, cobalt-blue annular beads are rare in much of western Scotland. Cobalt-blue beads appear at many sites in this region, as do many other blue beads, but the annular beads only appear at Dunadd and Kildonan Bay. Both are also the only sites with blue beads and with evidence of Iron Age or local Roman period activity in this region. Given the lack of annular blue beads in early medieval contexts in western Scotland and their general concentration in non-Roman sites, it is probable that these beads were predominantly in use by native populations during the Iron Age.

Swag and Double-Swag Beads

Beads with one wavy line or two intersecting wavy lines encircling the body appear with relative frequency and are generally white "swag" lines on a blue ground (Figure 12, a). Sometimes there is a reticella-zone line running across a single swag line or the swag line itself is reticella (Figure 12, b). These appear to span several phases and range from

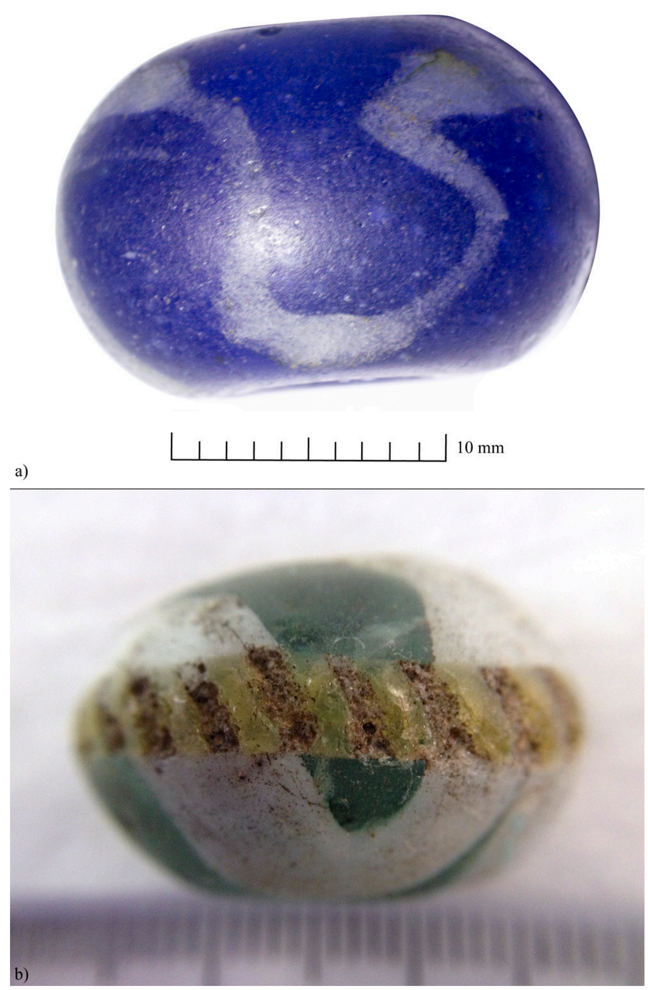

Figure 12. Swag beads: a) bead with a single swag line from Buchan in Aberdeenshire (ABDUA 15531; © University of Aberdeen), and b) bead with a single swag line and a reticella zone line from Newstead in the Scottish Borders (X.FRA.900; courtesy of National Museums Scotland).

large annular to small cylindrical forms. There are more sites in southern and western Scotland with swag beads than in northern Scotland, perhaps indicating a difference in preference from the triskele and whirl beads (Figure 13). Unfortunately, there are not enough swag beads of specific types to examine geographic distributions more fully.

Reticella and Herringbone Beads

Reticella beads sometimes appear in Early Medieval or Norse period contexts, and are often identified as Irish in origin due to similarities in style (Mannion 2015). Beads with a reticella swag line across the bead appear to belong to the Iron Age and Early Medieval periods, particularly given the occasional reticella line included in the whirl beads discussed above. The reticella swag beads are often equivalent to Guido's (1978:76-77) Iron Age Class 9, but many are closer to swag beads than the cabled beads she describes. Some beads also consist solely of a reticella-zone line dividing the bead into halves, which is more common in Scotland than a non-reticella-zone line. When these reticella-zone lines appear, they generally overlie a single-colored swag line, further strengthening the argument for a closer relationship with swag beads than with Guido's cable beads in Scotland (Figure 12, b).

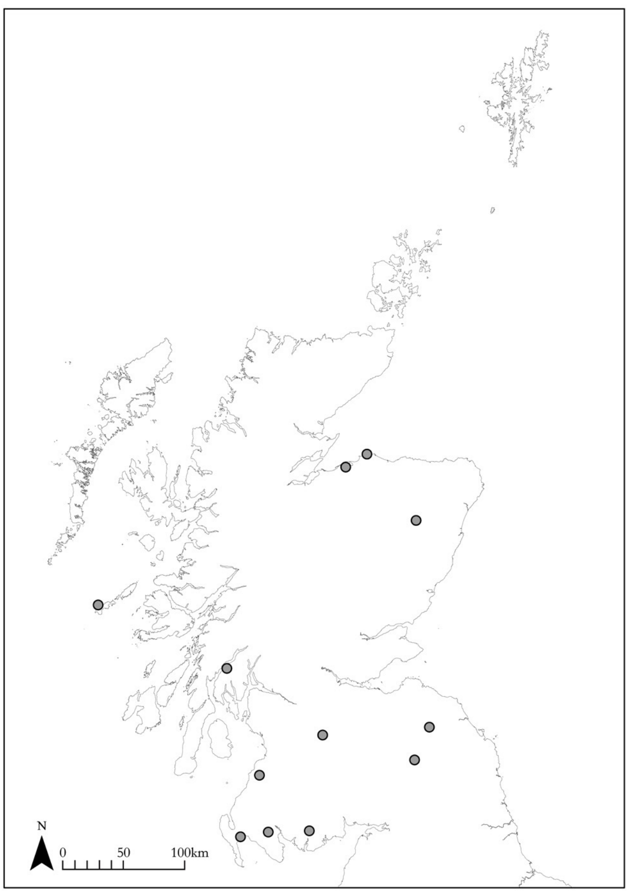

Figure 13. Sites with swag beads, showing possible concentrations in southern Scotland.

Other beads have reticella collars, with some adding reticella trails starting from one collar and fading towards the other. The origin of these reticella trails tend to alternate between collars and sometimes end with a single raised dot instead of meeting the opposite end. These beads are most likely Irish in origin, given how few have been found in Scotland compared to Ireland.

Finally, there are small numbers of beads made by winding reticella rods rather than single-colored canes of glass (Figure 14). Two examples come from Dunadd, while a third was found on Skye. These are always of dark blue and white reticella and usually globular in form. Unfortunately, not enough beads of this type have been recovered to allow for further geographic or chronological analysis.

Metal-Foil Beads

Segmented gold-foil beads are very occasionally found in Early Medieval contexts in Scotland while segmented silver-foil beads are relatively common in Norse contexts. Perhaps the best known of these is a necklace of 44 silver-foil beads in colorless, yellow, or deep blue glass found with a female burial at Cnip on the Isle of Lewis. Analysis of metal-foil beads in Scotland is rare, but the composition of those found at Ribe suggests they were made in or near Alexandria, Egypt (Sode and Feveile 2002:12).

Eye Beads

Several types of eye bead are also common. Many have regular white or yellow dots on a dark blue ground while others have a series of white rings on a dark blue ground. Stratified eye beads with white spirals on raised bosses and a dark blue ground are relatively common (Figure 15, a). Still another style of eye bead found in some Early Medieval contexts has a dark ground with a white double swag line and raised bosses of either black, white, and red eyes or black, red, and green eyes (Figure 15, b). Unfortunately, there are not enough examples from secure contexts to be able to discuss their distribution.

Figure 14. Reticella bead from Culbin Sands in Moray (X.BIB.21; courtesy of National Museums Scotland).

Evidence for Glass Beadmaking in Scotland

Some sources discussing the glass bead assemblages in Scotland suggest there was a manufacturing center at Culbin Sands, largely due to the number of beads found there and a couple of examples of fused glass (Guido 1978:34, 74). Yet, the number of beads found at Culbin Sands for any given period is highly suspect, given the lack of contextual information relating to each and the long multi-period occupation of the site. Additionally, glass can fuse in contexts other than production so the manufacture of beads at Culbin Sands is therefore questioned by most bead specialists looking at the Scottish material.

While Whithorn in southwestern Scotland has significant evidence for glassworking, it is entirely related

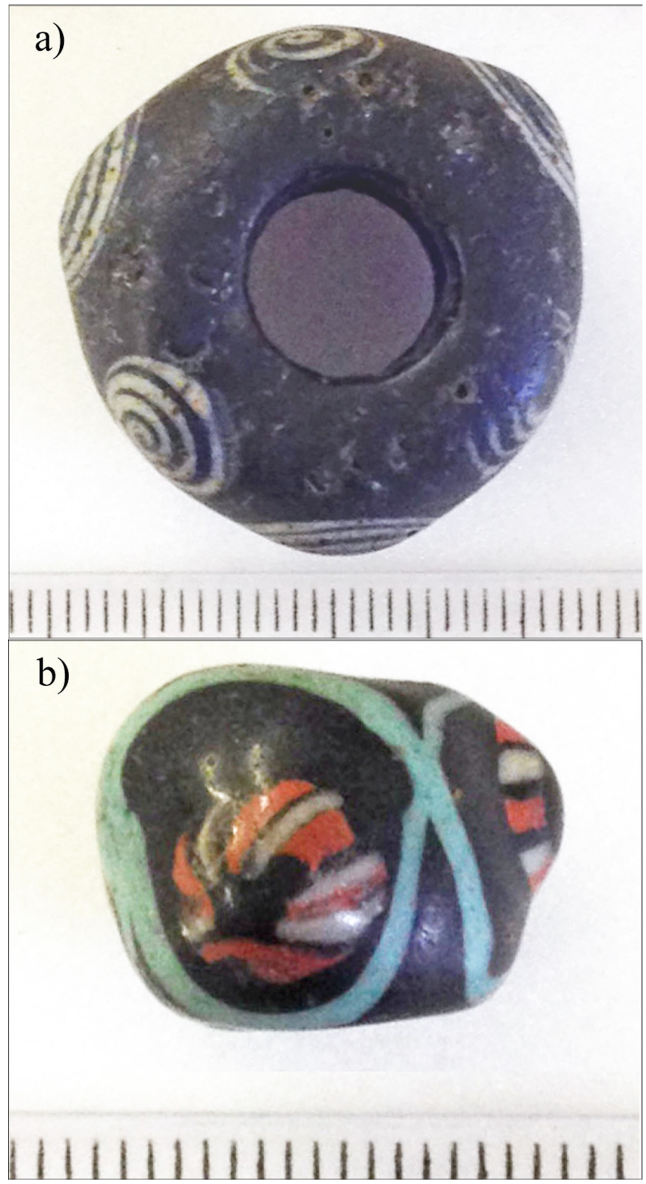

Figure 15. Spiral eye bead (a) from Gilmerton in Midlothian (X.FJ.99) and a double swag and eye bead (b) from Kirkchrist in Dumfries and Galloway (X.FJ.81) (courtesy of National Museums Scotland).

to the manufacture of glass vessels rather than beads (Campbell, Hill, and Price 1997). There is also a relative lack of glass beads at Whithorn compared to glass vessels and sherds, suggesting its primary focus was on vessels.

Some fused lumps of glass and crucibles with colored glass inside have been found at Traprain Law, though the literature largely implies they are connected to the manufacture of glass bangles (Guido 1978:36; Kilbride-Jones 1938). Guido (1978:36) also suggests Newstead may have been a manufacturing center, but this seems based on the number of objects recovered rather than on any specific evidence for glassworking.

There is evidence of glassworking at Castle Hill in Ayrshire, including several glass canes and slag matching the material of the beads (Smith 1919:128). Despite the evidence, it appears that further consideration of Castle Hill as a manufacture site is rarely discussed in the literature. The site has eight, small, yellow annular beads, one dark blue melon bead, one blue bead otherwise not described, and one brownish-yellow undecorated annular bead. Given the identification of two phases of occupation by Smith (1919:129) – one in the 1st-2nd centuries AD and the other during the Viking period – it is likely the glass predominantly dates to the first period of occupation.

To my knowledge, there has been no other discussion of factory or workshop-level glass bead production within Scotland. While the uniqueness of many bead types in Scotland supports local manufacture, there is little evidence for such practices on a large or systematic scale. This is most likely not due to a lack of local manufacture, but to the relative lack of wasters created in winding glass beads by an individual craftsperson compared to larger-scale endeavors or, indeed, the industry associated with drawn beadmaking (Francis 1991, 2002). Local manufacture of certain types of glass beads in Iron Age and Early Medieval Scotland was therefore likely done by certain skilled and perhaps itinerant workers rather than established workshops.

DISCUSSION AND CONCLUSION

While the glass bead assemblage in Scotland appears relatively sparse compared to its neighbors, there are many unique designs and styles that suggest a mastery of the craft for at least the Iron Age, if not beyond. I am unaware of any beads similar to the marbled examples discussed here which, while few in number, demonstrate significant skill in glass bead manufacture and design. Triskele and whirl beads are also unique to Scotland and form the largest number of decorated beads for the Iron Age, again suggesting a skill in manufacture and design within the modern borders of Scotland. Far from Guido's unskilled tribesmen, glass beadmakers in Scotland were continually experimenting with color, style, and design.

There are also significant differences in color, design, and style preference both between regional Scottish assemblages and between these assemblages and those found in neighboring regions. Discussions of beads in Scotland rarely consider regional differences due to a general lack of research on glass beads in general. The degree to which various bead type distributions mirror known trade networks and cultural influences further strengthens theories concerning trade in Scotland and provides new information about trade and craft production for the glass industry in the Iron Age and Early Medieval periods. Further study of these objects, including chemical analysis and investigations of surface wear, will only improve our knowledge of this industry.

The impressive designs of Scottish beads and the differences between Scottish and neighboring assemblages demonstrate a significant need for a large-scale analysis of these objects. They also advocate for a broader understanding of beads in Iron Age and Early Medieval Scotland than that generated by the frequent practice of identifying types based on assemblages designed for neighboring and sometimes non-contemporary groups. Given the impressive vessels created by craftspeople at place like Whithorn, it should not be surprising that glass beads might also show significant skill and artistry. While examining the data from a purely Scottish perspective would be detrimental due to a lack of context from neighboring regions, the complete lack of a Scottish perspective has proven detrimental to our understanding of these assemblages as well. The data provided and discussed here will hopefully initiate a lengthy discussion of glass beads from Scottish contexts such that, in the future, we can approach these objects from the perspective of Scottish typology and contextual analysis, in addition to that from neighboring groups.

APPENDIX A. SCOTTISH SITES WITH GLASS BEADS LIKELY DATING TO THE IRON AGE AND EARLY MEDIEVAL PERIOD (800 BC-AD 800)

The following is a list of sites with glass beads from contexts likely dating to the Iron Age and Early Medieval Period in Scotland. It is not a complete list, but it is more complete than any list published to date. Due to space limitations, only locational data (where possible) and the number of known glass beads found at each site have been included. These numbers come from a compilation of data from Guido (1978, 1999), Bertini et al. (2011), and from the collections at the National Museum of Scotland, the Hunterian Museum and Art Gallery, the Marischal Museum, the Kilmartin House Museum, the Iona Abbey Museum and the Archaeology Department at the University of Glasgow.

Appendix A (continued).

Site Name	Canmore ID	Province	OS Grid Reference	Descriptive Location	Glass Beads
A' Cheardach Mhor		Na h-Eileanan Siar		South Uist	2
Aberdeenshire		Aberdeenshire		Aberdeenshire	12
Airyolland Crannog		Dumfries and Galloway		Wigtownshire	14
Aitnock Fort		Ayrshire		Dalry, Ayrshire	1
Arnabost		Argyll and Bute	NM 2096 6003	Coll	2
Balevullin		Argyll and Bute	NL 95783 46292	Argyll	3
Balinaby		Argyll and Bute	NR 218 671	Islay	8
Ballater Glenmuick		Aberdeenshire			1
Ballogie		Aberdeenshire	NO 571 955	Aberdeenshire	1
Balmerion	16326		NJ 27 34	Glenrinnes, Banffshire	1
Balure Dun	290103	Argyll and Bute	NR 78270 85750	Argyll and Bute	3
Banff	18579	Aberdeenshire			1
Barburgh Mill	65789	Dumfries and Galloway	NX 90215 88428	Nithsdale, Dumfries and Galloway	1
Bedrule		Scottish Borders	NT 598 180	Roxburghshire	1
Beetloun		Aberdeenshire		Aberdeenshire	1
Birrens		Dumfries and Galloway		Dumfriesshire	5
Birse		Aberdeenshire	NO 55 97	Aberdeenshire	1
Blelack		Aberdeenshire	NJ 43 03	Aberdeenshire	1
Bonchester Hill		Scottish Borders	NT 59500 11700	Roxburghshire	1
Brighouse Farm		Fife	NO 407 216	Fife	1
Buchan		Aberdeenshire			1
Buck of Cabrach		Aberdeenshire	NJ 29 34	Aberdeenshire	1
Burghead		Moray	NJ 1090 6914	Moray	1
Cairnhill	19252	Aberdeenshire	NJ 7839 5225	Aberdeenshire	1
Camelon		Stirling	NS 864 809	Stirlingshire	2
Camphouse					1
Castle Craig	26048	Perth and Kinross	NN 97604 12714	Perthshire	1
Castle Island		Scottish Borders		Wigtownshire	2
Castle Newe		Aberdeenshire	NJ 3797 1235	Aberdeenshire	1
Castle O'er		Dumfries and Galloway		Dumfriesshire	2
Castlehaven Fort		Dumfries and Galloway		Borgue, Kirkcudbrightshire	1

Appendix A (continued).

Site Name	Canmore ID	Province	OS Grid Reference	Descriptive Location	Glass Beads
Castlehill		Ayrshire	NS 2859 5362	Dalry, Ayrshire	10
Cawdor		Highland	NH 847 498	Nairn	9
Chapel of Garioch	185105	Aberdeenshire		Aberdeenshire	1
Clachbreck		Argyll and Bute		Argyll and Bute	1
Clarilaw Muir		Scottish Borders	NT 512 286	Scottish Borders	1
Clerkley Hill		Moray		Moray	1
Clettraval		Na h-Eileanan Siar		North Uist	1
Clickhimin		Shetland Islands		Shetland	1
Cloisterseat		Aberdeenshire	NJ 90 26	Aberdeenshire	5
Clova		Aberdeenshire	NJ 45 22	Aberdeenshire	1
Coldingham		Scottish Borders	NT 904 661	Berwickshire	1
Coldstone		Aberdeenshire	NJ 44 06	Aberdeenshire	2
Corbanchory Farm		Aberdeenshire	NJ 488 151	Cushnie, Aberdeenshire	1
Coulter		South Lanarkshire	NT 02 33	Strathclyde	7
Covesea		Moray	NJ 1750 7072	Moray	6
Craigsfordmains		Scottish Borders	NT 565 382	Berwickshire	2
Crichton House		Midlothian	NT 400 624	Midlothian	1
Crossmichael Burial Ground		Dumfries and Galloway	NX 7 6	Kirkcudbrightshire	1
Croy		Highland	NH 7950 4936	Inverness-shire	4
Culbin Sands		Moray	NJ 0 6	Moray	532
Dalmeny					11
Denholm		Scottish Borders	NT 568 185	Roxburghshire	21
Dowalton Loch		Dumfries and Galloway	NX 40 46	Wigtownshire	2
Dryburgh		Scottish Borders	NT 591 320	Berwickshire	3
Drymen Sands		Argyll and Bute		Argyll	4
Dun an Iardhard		Highland	NG 2311 5042	Dunvegan, Skye	3
Dun Beag		Highland	NG 3395 3861	Struan, Skye	6
Dun Cul Bhuirg		Argyll and Bute	NM 2649 2462	Iona	3
Dun Fhinn	38467	Argyll and Bute	NR 6572 3064	Argyll and Bute	1
Dun Troddan		Highland	NG 83400 17244	Glenelg, Invernesshire	1
Dunadd		Argyll and Bute	NR 8365 9356	Argyll	12

Appendix A (continued).

Site Name	Canmore ID	Province	OS Grid Reference	Descriptive Location	Glass Beads
Dunagoil		Argyll and Bute		Bute	4
Dunbartonshire				Dunbartonshire	1
Dykeside		Orkney Islands	HY 305 223	Harray, Orkney	1
Earlston		Scottish Borders	NT 57 38	Scottish Borders	4
Eilean da Mheinn		Argyll and Bute	NR 781 944	Argyllshire	1
Eilean Righ		Argyll and Bute	NM 8041 0220	Loch Craignish, Argyll	1
Evie		Orkney Islands		Orkney	1
Fendom Sands		Highland	NH 82 82	Tain, Ross and Cromarty	6
Fetlar		Shetland Islands	HT 69 91	Shetland	1
Forteviot		Perth and Kinross	NO 052 170	Perthshire	2
Gilmerton		Midlothian	NT 29 68	Midlothian	1
Glenbuchat Hill		Aberdeenshire	NJ 33 18	Aberdeenshire	1
Glenluce Sands		Dumfries and Galloway	NX 132 551	Wigtownshire	53
Glenshee		Perthshire		Lair	1
Golspie Links		Highland	NH 81 97	Sutherland	6
Ha’ of Bowermadden	8856	Highland	ND 2398 6369	Highland	1
Haliburton Mains	57291?	Scottish Borders	NT 672 485	Greenlaw, Berwickshire	1
Harris		Na h-Eileanan Siar		Harris	1
Haughton		Aberdeenshire	NJ 58 16	Aberdeenshire	1
Hillswick		Shetland Islands	HT 28 77	Shetland	2
Housgord	127971?	Shetland Islands	HT 39 53	Sheltand	1
Hownam Rings		Scottish Borders	NT 7904 1939	Morebattle	1
Hyndford Crannog		South Lanarkshire	NS 9061 4187	Lanark	1
Inveresk		East Lothian	NT 3475 7095	East Lothian	1
Iona Abbey	21664	Argyll and Bute	NM 28683 24515	Iona	1
Jericho	18285	Aberdeenshire		Aberdeenshire	2
Kaimes Hil		Midlothian	NT 1315 6655	Ratho, Midlothian	2
Keil Cave		Argyll and Bute	NR 6716 0770	Southend, Kintyre, Argyll	1
Keith	17381	Moray	NJ 42 50	Moray	1
Kildonan Bay	38756	Argyll and Bute	NR 7806 2778	Kintyre	1
Kildrummy	17094	Aberdeenshire	NJ 45 18	Aberdeenshire	2

Appendix A (continued).

Site Name	Canmore ID	Province	OS Grid Reference	Descriptive Location	Glass Beads
Kinnord		Aberdeenshire	NO 44 99	Aberdeenshire	1
Kirkchrist		Dumfries and Galloway	NX 361 590	Dumfries and Galloway	1
Kirkmaiden		Dumfries and Galloway	NX	Dumfries and Galloway	1
Ladymire Farm	20349	Aberdeenshire	NJ 975 299	Aberdeenshire	1
Legerwood		Scottish Borders	NT 58 43	Scottish Borders	1
Lesmahagow			NS 81 39		1
Licklyhead	18210	Aberdeenshire	NJ 62 23	Aberdeenshire	1
Linton Farm		Scottish Borders	NT 77 26	Scottish Borders	1
Loch Eriboll		Highland	NC 4038 5409	Durness, Sutherland	1
Loch Glashan		Argyll and Bute	NR 9159 9249	Argyll	1
Loch Gruinart		Argyll and Bute	NR 295 714	Islay	1
Loch Ronald		Dumfries and Galloway	NX 26 64	Dumfries and Galloway	1
Lochlea		South Ayrshire	NS 4575 3027	South Ayrshire	2
Lochspouts Crannog		Ayrshire	NS 2885 0586	Ayrshire	2
Meiklelaw Field		East Lothian	NT 4564 6090	Fala	7
Midmar		Aberdeenshire	NJ 6 0	Aberdeenshire	1
Mill of Gellan		Aberdeenshire	NJ 5092 0188	Aberdeenshire	3
Mosspebble		Dumfries and Galloway	NY 3848 9328	Dumfries and Galloway	1
Mote of Mark		Dumfries and Galloway	NX 84 50	Dumfries and Galloway	1
Mouswald		Dumfries and Galloway	NY 061 738	Dumfriesshire	2
Nairnshire					1
Nether Tofts		Scottish Borders	NT 553 146	Roxburghshire	1
New Mill		Scottish Borders	NT 6572 2271	Roxburghshire	1
Newstead		Scottish Borders	NT 572 344	Roxburghshire	35
Orkney		Orkney Islands		Orkney	2
Orton		Moray	NJ 31 52		1
Philiphaugh		Scottish Borders	NT 436 279	Selkirk, Scottish Borders	1
Pitchroy		Moray		Moray	1
Plestie					1
Rhynie	17206	Aberdeenshire	NJ 49 27	Aberdeenshire	1
Rink		Scottish Borders		Selkirkshire	1
Riverside Field		Scottish Borders		Dryburgh, Berwickshire	1

Appendix A (continued).

Site Name	Canmore ID	Province	OS Grid Reference	Descriptive Location	Glass Beads
Ruberslaw		Scottish Borders	NT 5803 1557	Roxburghshire	25
Rule					1
Rulewater		Scottish Borders		Roxburghshire	1
Rumbleton		Scottish Borders	NT 690 455	Berwickshire	1
Scotston	165434	Aberdeenshire		Aberdeenshire	1
Scottish Borders		Scottish Borders		Scottish Borders	1
Scurdargue		Aberdeenshire	NJ 48 28	Aberdeenshire	1
Selkirk		Scottish Borders		Selkirkshire	3
Siccar Point		Scottish Borders	NT 8111 7088	Berwickshire	1
Skewalton		Ayrshire		Ayrshire	2
Skye		Highland		Skye	1
Slains	20972	Aberdeenshire	NK 04 30	Aberdeenshire	1
Smithston	17677		NJ 518 295	Kennethmont Parish, Aberdeenshire	2
Soutra		Midlothian	NT 451 604	Midlothian	1
Strathdon		Aberdeenshire	NJ 3 1	Aberdeenshire	1
Strathlachlan		Argyll and Bute	NS 02 94	Argyll and Bute	1
Tap O’ Noth	17205	Aberdeenshire	NJ 48 29	Aberdeenshire	1
Tigh Talamhanta		Na h-Eileanan Siar	NF 6767 0220	Allasdale, Barra	2
Todhaugh		Scottish Borders	NT 837 562	Roxburghshire	16
Tough	18077	Aberdeenshire	NJ 6 1	Aberdeenshire	1
Townfoot		South Lanarkshire	NT 023 345	South Lanarkshire	1
Traprain Law		East Lothian	NT 580 747	East Lothian	43
Tressness		Orkney Islands		Orkney	1
Ugadale Point	38760	Argyll and Bute	NR 7851 2851	Kintyre	4
Unknown					13
West Linton		Scottish Borders		Peebleshire	24
West Mains of Ethie		Angus	NO 6928 4600	Inverkeilor, Angus	1
Wick		Highland		Caithness	1
Wigtownshire		Dumfries and Galloway		Wigtownshire	3
Woodside, Ardvannie	13809	Highland	NH 6855 8747	Highland	1
Yair		Scottish Borders	NT 45 32	Selkirkshire	1

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A GLASS BEAD SEQUENCE FOR SOUTH AMERICA BASED ON COLLECTIONS FROM BRAZIL AND GUYANA

William T. Billeck and Meredith P. Luze

Glass trade bead assemblages recovered during archaeological investigations at nine sites by Smithsonian archaeologists Betty Meggers and Clifford Evans in Brazil in 1948 and 1949 and Guyana in 1952 and 1953 date to multiple time periods, including the early 17th, mid-18th, mid-19th, and mid-20th centuries. The assemblages are used to show that the glass bead chronologies developed in North America are directly applicable to South America and that there is a global glass bead sequence related to European colonialism. White drawn glass beads were independently dated by comparison with known composition changes through time in how the glass was made opaque. Compositions were determined using pXRF.

INTRODUCTION

In the 1940s, Betty Meggers and Clifford Evans began an ambitious, decades-long program to document and establish regional archaeological sequences in South America. Meggers continued the research after Evans' death in 1981 until her own death in 2012, after spending more than 70 years at the Smithsonian. This paper will reexamine one aspect of the material culture they recovered: glass trade beads from European contact-period sites. Of the hundreds of archaeological sites they investigated, they obtained glass beads from just ten and, of those, nine sites are considered here. The tenth site, in Ecuador, is presently under study and dates to the mid-16th century. The beads from the nine archaeological sites are in the collections of the National Museum of Natural History (NMNH), Smithsonian Institution.

In 1948 and 1949, Meggers and Evans recovered glass beads from four sites in Brazil near the mouth of the Amazon (Meggers and Evans 1957). Their excavations in 1952 and 1953 at five sites in Guyana, then known as British Guiana, yielded additional glass beads (Evans and Meggers 1960). They consulted with archaeological bead experts on the chronological placement of the beads from Brazil, including Arthur Woodward, Glenn Black, and Kenneth Kidd. They did not, however, solicit similar opinions for the beads from Guyana.

There are several reasons to reanalyze these glass bead assemblages. First, in their publications, Meggers and Evans rejected the assessments provided by the bead experts and instead suggested that the assemblages could not be dated by comparison to North American chronologies. Second, since glass bead studies have progressed substantially since these assemblages were first described, much more can be said about the bead sources, and glass bead chronologies have been greatly refined. A third reason for a reanalysis is to provide information on glass beads from South America since not many descriptions of glass bead assemblages from that region are available, particularly for assemblages that post-date the 16th century. Another goal of this study is to show that the chronological sequences for glass beads in North America can be directly applied to South American assemblages, demonstrating that the presence of European glass beads provides some of the earliest evidence for colonialism and serve as markers for globalization.

BEAD CLASSIFICATION

The glass beads are described following the classification system developed by Kidd and Kidd (1983) with revisions by Karklins (2012) based on the method of manufacture, color, diaphaneity, and shape. For beads dating to the 18th century and earlier, when these attributes can be matched to a specific bead variety in the classification system, it is recorded as that variety (e.g., IIa56). Beads that do not exactly match a specific variety are noted with an asterisk (*). For 19th-century and later sites, only the type codes are provided (e.g., IIa, IVa, WIb) since the senior author views the classification system for color as best applied to earlier assemblages.

White drawn beads that are described as circular in the Kidd and Kidd system are here referred to as short barrels. In addition, small heat-rounded white drawn beads sometimes appear to have two or more layers of opaque white glass, often with a degraded thin outer layer of colorless glass which is difficult to discern. This layer is not considered when determining whether a bead is of simple (IIa) or compound (IVa) construction (Karlis Karklins 2019: pers. comm.).

XRF ANALYSIS OF THE WHITE GLASS BEADS

The x-ray fluorescence (XRF) spectrometry analysis of the beads obtained by Meggers and Evans is an offshoot of an ongoing study of North American bead assemblages (Billeck and McCabe 2018) that builds on earlier studies of temporal changes in the composition of opaque white drawn beads (Blair 2017; Hancock 2013; Hancock et al. 1997; Moreau et al. 2002, 2006; Sempowski et al. 2000). Most of the earlier studies have focused on determining the opacifiers used in the 17th century to assist in the dating of sites of this time period. The type of opacifier used changes through time, however, resulting in distinctive chemical compositions and these compositions can be readily detected with XRF.

The compositions were determined using a Bruker Tracer 5i with 3 mm collimator for an assay time of 30 seconds with the settings kV=50, µA=35, and a Cu 200µm, Ti 25µm, Al 300µm filter. The Bruker Tracer 5i is a portable instrument that can be handheld and described as pXRF. The instrument emits an x-ray at a target and the x-ray disrupts the atoms or elements in the object. The energy pattern created by the disrupted elements is mapped as a spectrum that can be examined to identify the glass composition. The opacifiers used to make white beads opaque are typically one or more of the following elements: lead, antimony, and arsenic. All of these can be easily identified in glass beads by using XRF. An advantage of XRF is that it is nondestructive and a large number of glass beads can be quickly analyzed.

Previous studies (Blair 2017; Dussubieux and Karklins 2016; Hancock 2013; Hancock et al. 1997; Moreau et al. 2002, 2006; Sempowski et al. 2000) have documented the temporal changes in white glass bead opacifiers. Blair (2017: Table 1) used XRF to help understand the internal chronology of the Mission Santa Catalina de Guale beads, and summarized all previous studies of the opacifiers used in drawn white glass beads. The studies show that before 1625, white drawn beads were opacified with a tin-lead calx that results in beads that have high levels of tin and lead (hereafter SnPb). Between 1625 and 1675, there is a change in opacifiers from SnPb to a calcium antimonate, resulting in beads that are high in antimony (hereafter Sb). Beginning in the early 1800s, lead arsenate becomes increasingly common, yielding glass that is high in arsenic and lead (hereafter AsPb). White drawn beads are sometimes opacified with lead antimonate, producing beads that are high in antimony and lead (SbPb). Such beads have been rarely identified in 18th-century assemblages, but can be common in those of the 19th century (Billeck and McCabe 2018).

XRF analysis was applied to drawn white beads in the assemblages from Brazil and Guyana to assist in dating them. A total of 161 beads from the nine archaeological sites were sampled (Table 1). White beads from both Brazil and Guyana contained SnPb, Sb, and AsPb. One bead contained Sb and low Pb. A bead recorded with an element relating to the opacifier must have a spectrum peak at least ten times the height of the rhodium backscatter. When an element is recorded as low, it is at least five times and less than ten times the height of the rhodium backscatter. The bead varieties from four sites (E-2, E-28, R-34, and A-3) were sampled with a minimum of 10 beads per variety from each site. All the white beads at five sites were analyzed.

COLONIAL HISTORY

Guyana

The first Europeans to establish a settlement in what became Guyana were the Dutch who began their settlement and trading operation in 1616 with the aim of trading with indigenous communities (MacDonald 1992:3, 6). Prior to the establishment of settlements, various European nations had succeeded in trading along the coast beginning in the 1500s (Smith 1962:13). The Spanish had originally claimed the land of the Guyanese colonies but did not establish settlements and officially recognized Dutch sovereignty in 1648 (MacDonald 1992:6). Soon after Dutch settlement, the French and British also began settling and laying claim to lands between the Orinoco and Amazon rivers, although no single colonizing nation could hold more than small areas (Smith 1962:14). The Dutch quickly abandoned attempts to enslave the indigenous peoples, instead choosing to trade Dutch goods for local cotton, dyes, and wood, while importing enslaved Africans to work on plantations (Smith 1962:14-15). The Dutch settled three separate colonies in Guyana over the course of the 17th and 18th centuries, all governed under the umbrella of the Dutch West India Company (MacDonald 1992:6).

Table 1. Opacifiers Present in Drawn White Glass Beads.

Site	Bead Variety	Opacifier					Total
		AsPb	Sb	Sb Low Pb	SnPb	Sn low Pb	
E-2	IIa	10	0	0	0	0	10
E-28	IIa	10	0	0	0	0	10
R-1	IIa12*	0	4	0	0	0	4
	IIa14	10	0	0	0	0	10
R-20	IIa12*	0	1	0	0	0	1
	Ia4*	0	7	0	0	0	7
R-34	IIa12*	0	25	0	0	0	25
A-10	IIa12*	0	12	0	0	0	12
A-15	IIb18	0	3	0	0	0	3
A-3	IIa12*	0	30	0	0	0	30
	IIa13	0	0	1	7	0	8
	IIb18	0	0	0	0	3	3
	IVa11	0	0	0	1	0	1
A-4	Ib11	0	0	0	2	0	2
	IIa13	0	0	0	5	0	5
	IIb20	0	0	0	1	0	1
	IIg3	0	0	0	2	0	2
	IVa11	0	0	0	27	0	27
Total		**30**	**82**	**1**	**45**	**3**	**161**

British colonists began immigrating to the Guyanese colonies in large numbers in the mid-1700s, constituting a majority of the colony of Demerara by 1760 (MacDonald 1992:7; Smith 1962:16). The flow of British colonists continued throughout the 18th century and by 1786, the British effectively controlled the still legally Dutch colony (MacDonald 1992:7). Between 1781 and 1814, the colonies were captured and recaptured by the British, French, and Dutch a total of seven times, until the Netherlands formally ceded the colonies to Britain in 1814 (MacDonald 1992:8-9; Smith 1962:24-25). Britain created the colony of British Guiana in 1831 when it combined the three colonies of Berbice, Demerara, and Essequibo into one, with the capital in Georgetown (MacDonald 1992:3; Smith 1962:26). The slave trade was abolished in 1807 and slavery was finally abolished in 1838, but the colonists still needed vast quantities of labor to work the plantations, leading planters to lure Portuguese, Chinese, German, British, and Indian immigrants to the colony on indenture contracts (Khemraj 2015:161-168; MacDonald 1992; Smith 1962). Surviving indigenous peoples largely retreated beyond the boundaries of colonial settlement, and many descendants of enslaved Africans began to regard themselves as the "natives" of Guyana by the late 19th century (Khemraj 2015:177; MacDonald 1992:6).

Brazil

The first Europeans to view Brazil were Portuguese explorers en route to India in 1500. The Portuguese claimed the land but did not begin to establish settlements until 1530, when they began to feel threatened by French traders who had landed in Brazil in 1504 and established trade relations with the indigenous peoples (Metcalf 1992:27-29; Smith and Vinhosa 2002:1-5).

The indigenous peoples with whom the Portuguese made first contact were the coastal Tupi speakers. As the Portuguese continued their explorations, they encountered other Tupi speakers along the Amazon basin, along with Carib and Arawak speakers, and the Gê of the central plateau (Levine 1999:31; Smith and Vinhosa 2002:31). The Tupi generally described the inland Gê-, Carib-, and Arawak-speaking groups pejoratively as the Tapuia, a name later adopted by the colonists to vilify the groups that resisted colonization (Langfur 2014:16). The Tupi were semi-sedentary, organized primarily into kin- and clan-based villages rather than towns, and largely without a unified political organization (Langfur 2014:7-9).

Although Brazil was a Portuguese colonial territory, other European nations had an interest in the area. The Dutch were present along the coast north of the mouth of the Amazon from about 1600 to 1630 (Meggers and Evans 1957:556-566). The English, French, and Irish also traded along the Amazon River until the 1630s, with the Dutch concentrating on the Amazon valley and the English and Irish focusing on the north bank and mouth of the Amazon (Whitehead 2014:87-89). The Dutch established a colony in Pernambuco south of the Amazon in 1630 and expanded through time to the mouth of the Amazon until their expulsion in 1654 by the Portuguese (Levine 1999:43-44; Smith and Vinhosa 2002:9-10). The Dutch allowed English, French Protestant, German, Polish, Danish, Swedish, and Dutch Jewish colonists to settle in their Pernambuco colony, although the Jews were expelled once the Portuguese regained control of the colony (Levine 1999:43-44). While the indigenous peoples traded with the Portuguese and other Europeans, they did not develop a dependency on European trade goods, although they did integrate these goods into their traditional ornamentation, often adapting them to suit their needs (Bieber 2014:182-183). European goods may also have conveyed a certain prestige to their owners (Bieber 2014:183).

The early colonists favored a paternalistic approach to the indigenous peoples, initially seeking to civilize and Christianize rather than enslave (Langfur 2014:23; Metcalf 2014:37). Missionaries arrived in Brazil in the mid-1500s, and Jesuits established the first *aldeia* (mission village) in 1558 (Metcalf 2014:47). These *aldeias* frequently combined many indigenous villages into one, some combining as many as 15 distinct villages (Metcalf 2014:47). Due to the mixing of numerous distinct ethnic groups within each *aldeia*, the indigenous peoples began to lose their specific tribal identities, instead becoming the Indians of a specific *aldeia* (Almeida 2014:79-80). Within the aldeias, the Native peoples generally continued to live in their traditional multifamily longhouses, called *ocas*, although in some of the oldest *aldeias* the inhabitants changed to small houses (Metcalf 2014:47-49).

Jesuits were not the only missionaries proselytizing to the indigenous peoples of Brazil; the Franciscans, Capuchins, the Fathers of Piedade and Conceição, the Carmelites, and the Jesuits divided the Amazon basin into areas of distinct missionary control (Levine 1999:36). Settlers and planters disliked the missionaries' monopoly over the indigenous population, desiring to control and exploit their labor, and succeeded in expelling the Jesuits in 1759 (Levine 1999:36; Metcalf 2014:52; Smith and Vinhosa 2002:15).

During the second half of the 18th century, indigenous peoples were increasingly enslaved as slaving expeditions into the interior increased. Those who were captured became *administrados* ("administered Indians") who could be held under the *administração* system and forced to labor for their captors, this even passing to their descendants (Langfur and Resende 2014:150; Metcalf 1992:75-76). In order to evade laws prohibiting indigenous slavery, administrators would often refer to their *administrados* by names corresponding to mixed-race categories, as mixed-race individuals born to enslaved mothers of African descent could be legally enslaved (Langfur and Resende 2014:154). Colonists could also enslave indigenous people through what were called "Just Wars," or if the people practiced cannibalism (Metcalf 1992:33). Portuguese planters generally preferred the labor of enslaved Africans to that of the indigenous peoples and, when possible, sought to utilize primarily enslaved African labor (Smith and Vinhosa 2002:23). As indigenous populations shrank, the African population grew as planters expanded African slavery until the abolishment of slavery in 1888 (Metcalf 1992:75, 204; Smith and Vinhosa 2002:33, 75).

Indigenous peoples generally became assimilated into Brazilian society through either voluntary or forced removal to *aldeias*, or they elected to relocate to the remote Amazonian jungle to preserve their lifeways (Smith and Vinhosa 2002:125). Indigenous peoples were largely ignored throughout Brazil's transition to an independent empire in 1821 and a republic in 1889, although several movements in the late 1800s and early 1900s advocated for the integration of indigenous peoples into Brazilian society (Smith and Vinhosa 2002:125). Brazil's tumultuous political climate continued through the 20th century, as military coups continued to unseat presidents until civilian government was restored in 1985.

BEADS FROM EXCAVATIONS IN GUYANA

Clifford Evans and Betty Meggers conducted archaeological investigations in 1952 and 1953 for the

Smithsonian Institution in Guyana, then British Guyana, visiting a number of archaeological sites in the rain forests and the nearby savanna. Glass beads were recovered from one WaiWai phase site and one Taruma phase site along the Essequibo River and from three sites assigned to the Rupununi phase in the Rupununi Savanna (Figure 1).

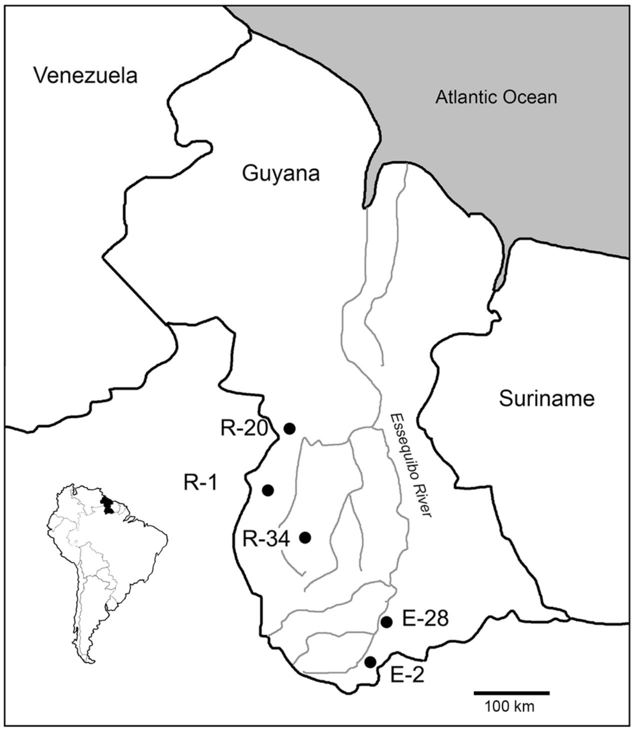

Figure 1. Archaeological site locations in Guyana (all images by William Billeck).

Twentieth-Century Beads from the WaiWai and Taruma Phases, Upper Essequibo Rain Forest

Site E-2, the Erefoimo site, is a WaiWai phase habitation on the right bank of the Essequibo River. The phase represents a 20th-century intrusion into the area by the Carib-speaking Waiwai (Evans and Meggers 1960:247, Figure 126). E-2 had standing structures when visited by Evans and Meggers and they reported that the site had been occupied from about 1944 to 1950. Among the items collected at the site are "glass 'seed' beads, some still strung on twisted cotton thread" (Evans and Meggers 1960:247-249, 256-257). The collection consists of very small and small, heat-rounded drawn beads in white, pink, blue, and red (Table 2; Figure 2). A sample of ten white beads was analyzed using XRF and all were high in AsPb (Table 1) and, based on the opacifier chronology, date to the second half of the 19th century or later.

Site E-28, Yukumnalulum, is a habitation site on the right bank of the Esseqibo River, and was assigned to the Taruma phase by Evans and Meggers. European-derived diseases decimated the Taruma Indians in the early 20th century and the Taruma phase is dated from ca. 1700 to ca. 1925, ending when the few surviving Taruma Indians went to live with other tribes (Evans and Meggers 1960:246, 339, Figure 126). The site was a surface scatter of objects 9 m in diameter consisting of sherds, 141 glass beads, two pieces of glass, one olive-green glass bottle fragment, and manioc grater chips (Evans and Meggers 1960:206, Table H). Some beads still had fragments of cotton thread from their original stringing and Evans and Meggers (1960:245, Table H) suggested the beads probably derived from a woman's beaded apron. The preservation of cotton thread is an indication that the site was occupied in the early 20th century. The beads are all small, heat-rounded drawn beads in white, black, colorless, orange, teal, blue, pink, and red (Table 2, Figure 2). A sample of ten white beads was analyzed with XRF and all were found to be high in AsPb (Table 1) and, based on the opacifier chronology, date to the second half of the 19th century or later.

Site E-2 is known to have been occupied between 1944 and 1950 by the Waiwai tribe, about two years before the beads were collected, with some of the beads still strung on cotton thread. Since cotton thread was also found with the beads from Site E-28, they are also likely to have been left only a few years before they were collected in 1952 or 1953. The bead varieties represented and the opacifiers used in the production of the white drawn beads are consistent with a 20th-century date for both sites.

Nineteenth-Century Beads from the Rupununi Phase, Rupununi Savanna

Site R-1, the Moco Moco Rock Shelter, is a Rupununi phase cemetery site on the side of the Kanuku Mountains near the Moco Moco River. Several funerary jars were present including a Kanuka Plain vessel that was associated with 14 very small white glass beads (Figure 2) (Evans and Meggers 1960:285, Table L, Plate 64c) that have an average diameter of 1.7 mm and average length of 1.0 mm. There are four IIa12* beads that have a thin colorless layer on opaque white (Munsell N 8.5/). These are listed here as IIa12* because IIa12 beads in the Kidd classification are translucent, and the R-1 beads are identified as opaque. Ten IIa14 beads are opaque white (Munsell N 9.0/) and have an average diameter of 1.8 mm and average length of 1.0 mm. The objects from R-1 were too few and undiagnostic, preventing Evans and Meggers from dating the site, but other

Table 2. Twentieth-Century Glass Beads from Sites E-2 and E-28, Guyana.

Site	Kidd Code	Color and Shape	Average Diameter mm	Average Length mm	Count
Site E-28,	IIa	Opaque white, N 9.25/, short barrel	2.3	1.1	92
Yukumnalulum,	IIa	Opaque pink, 2.5RP 6/6, short barrel	2.5	1.6	14
Taruma Phase	IIa	Opaque light blue, 7.5B 5/4, short barrel	2.1	1.1	9
	IIa	Opaque blue, 7.5PB 3/12, short barrel	2.0	0.9	24
	IIa	Translucent blue, 7.5PB 3/12, short barrel	3.0	1.7	1
	IVa	Translucent red, 10R 3/10, opaque white core, short barrel	3.0	2.5	1
	Ic	Opaque black, N 1/, hexagonal	1.9	1.4	40
	Ic	Translucent teal, 5BG 5/8, hexagonal	1.8	1.4	1
Site E-2, Erefoimo,	IIa	Colorless, short barrel	2.3	1.5	139
WaiWai Phase	IIa	Opaque white, N 9/, short barrel	2.3	1.2	9
	IIa	Opaque orange, 3.75YR 6/14, short barrel	2.4	1.2	1
	IIa	Translucent light purple-blue, 5PB 5/8, short barrel	2.8	1.5	22
	IIa	Translucent to opaque blue, 7.5PB 2/8, short barrel	2.2	1.1	724
	IIa	Opaque reddish-pink, 2.5R 4/4, short barrel	2.2	1.4	78
	IIa	Transparent red, 5R 3/8, short barrel	2.1	1.0	168
	IVa	Translucent red, 2.5R 5/10, white core, short barrel	2.1	1.2	1
Total					**1324**

Rupununi phase sites they excavated that had European trade objects were dated by them to the 19th and early 20th centuries (Evans and Meggers 1960:323, Tables M and N). XRF testing of the white beads revealed that the ten IIa14 beads are high in AsPb and the four IIa12* beads are high in Sb (Table 1). The very small size of the beads and their chemistry is typical of the first half of the 19th century when beads opacified with Sb or AsPb occur (Billeck and McCabe 2018). It is likely that the use of R-1 and the glass beads found there date to the 19th century.

Site R-20, the Uteteta Rock Shelter on Kawari-eng Mountain, was a habitation site with ceramics dating to the Rupununi phase. The shelter consists of several overhangs, each referred to as a cave, and glass beads were only found in Cave 2, along with sherds and deer bone (Evans and Meggers 1960:276-277, Table L). Ceramic seriation places Cave 2 within the later part of the Rupununi phase and Evans and Meggers (1960:Table N, Figure 125) suggest that occupation of the site occurred after 1900. One bead from Cave 2 is IIa12* that measures 2.9 mm in diameter and 2.2 mm in length. There are also seven opaque oyster white specimens with a thin colorless outer layer (Figure 2). Six are medium-sized beads that average 5.2 mm in diameter and 3.5 mm in length. One is small and measures 2.7 mm in diameter and 1.9 mm in length. XRF testing of all eight beads found they were all high in Sb (Table 1). The opacifier chronology would place the site in the first half of the 19th century or earlier. This disagrees with Evans and Meggers suggested date of after 1900.

Site R-34, Bei-Tau Rock Shelter No. 1, is a Rupununi phase site that had stone slabs covering funerary urns. While no human remains were preserved, funerary objects associated with a Kanuka Plain jar consisted of a perforated coin with an 1809 date, glass mirror fragments, a scraping tool chipped from a pale green glass bottle, part of an iron knife, and glass beads. Another Kanuku Plain jar contained approximately 3000 small white glass beads.

Figure 2. Glass bead varieties from sites in Guyana. Row 1) site E-28; Row 2) site E-2; Row 3, left) site R-20; Row 3, right) site R-1 (NMNH cat. nos. A419345, A419449, A419547, and A419595).

The beads were described and illustrated in drawings (Evans and Meggers 1960: Figure 124, Table L) and are redescribed here (Table 3; Figure 3). There are four dark blue and two black long faceted drawn beads and three red faceted spherical beads that are mold-pressed. These types are typical of those made in Bohemia and they appear in archaeological assemblages in the early- to mid-19th century in the United States (Billeck 2010, 2018a-c; Ross 1990, 2000). Small heat-rounded drawn beads occur in several colors including gray, light turquoise, light bluish-grey, dark reddish-grey, teal, white, and black. The beads have diameters that are generally about 3.5 mm and have lengths of about 2.5 mm; they are much larger than the average small heat-rounded drawn beads of the late-19th and 20th centuries. There are also several small, dark reddish-purple drawn beads that have been heat-rounded and then faceted with several random cuts. These beads are also common in the early- to mid-19th century (Billeck 2010, 2018a-c; Ross 1990, 2000). The 1809 coin, combined with comparisons to archaeological bead assemblages from the United States, dates the R-34 bead assemblage to after 1809, likely to the first half of the 19th century, a finding supported by the chemical composition of the beads. XRF testing of a sample of 25 white drawn beads found they were all high in Sb (Table 1). The transition from Sb to AsPb occurs in the first half of the 19th century (Billeck and McCabe 2018; Hancock et al. 1997) which, along with the bead styles, dates R-34 to the first half of the 19th century.

The Rupununi phase is estimated to date from approximately 1700 to 1900 (Evans and Meggers 1960: Figure 126) and the ceramics from the sites are Kuanuka Plain and Rupununi Plain vessel types, with the former being more common earlier in the phase. The glass bead assemblages from sites R-1, R-20, and R-34 can be dated by the bead varieties present, the opacifiers used in the manufacture of the white drawn beads, and by the presence of other artifacts. European trade goods appear in the Rupununi phase in the early to mid-19th century and persist into the early 20th century according to Evans and Meggers (1960:323, Tables M, N). The bead assemblages are consistent with this temporal range. The presence of the coin at R-34 establishes a firm post-1809 date (Evans and Meggers 1960:290) and the style of the beads indicates it is one of the earliest sites in the Rupununi phase to yield European trade goods, dating to the first half of the 19th century. Evans and Meggers (1960: Table N) estimate that R-20 dates to after 1900, but the opacifier used in the white beads is consistent with the first half of the 19th century or earlier. R-1 has very small heat-rounded drawn beads and their bead chemistry is consistent with that found in the first half of the 19th century or earlier.

BEADS FROM EXCAVATIONS IN BRAZIL

Meggers and Evans (1957) conducted archaeological investigations near the mouth of the Amazon River and

Table 3. Nineteenth-Century Glass Beads from Site R-34, Bei-Tau Rock Shelter No. 1, Rupununi Phase, Guyana.

Kidd Code	Color and Shape	Average Diameter mm	Average Length mm	Count
If	Opaque black, N 1/, long, 7-sided, 5 rows of facets	6.9	18.9	2
If	Translucent dark blue, 5PB 2/8, long, 7 sided, 5 rows of facets	6.8	18.9	4
IIa12*	Opaque white, 2.5Y 8.5/4; with a thin colorless outer layer, short barrel; these differ from IIa12 in that they are opaque rather than translucent	3.5	2.9	3162
IIa	Opaque blue-grey, 7.5B 8/2, short barrel	2.6	1.7	1
IIa	Translucent blue-green, 5BG 4/4, short barrel	3.3	3.2	1
IIa	Translucent teal, 7.5BG 5/6, short barrel	3.2	2.6	1
IIa	Transparent blue-purple, 2.5PB 4/6, short barrel	3.6	3.8	1
IIa	Translucent dark reddish-purple, 5RP 3/6, short barrel	3.4	2.5	26
IIa	Opaque black, N 1/, short barrel	3.5	1.9	2
IIf	Translucent dark reddish-purple, 5RP 3/6, short barrel, randomly cut facets	4.6	2.8	11
MPII	Transparent purple, 7.5P 4/8, spherical with a rounded equatorial ridge	9.4	5.3	1
MPIIa	Translucent red, 5R 3/8, spherical faceted, 3 rows of 6 cut facets, biconical perforation	7.4	4.7	7
Total				**3219**

also at a site several kilometers to the north of the river in 1948 and 1949. They recovered glass beads at two sites and also obtained beads from other investigators who excavated two additional sites. They identified Aristé phase sites predominantly in the region north of the Rio Araguarí-Amaparí which enters the Atlantic Ocean about 20 km north of the mouth of the Amazon (Figure 4). The Aristé phase did not have a specific date range proposed by Meggers and Evans (1957:587), but they believed it could extend into the 18th century. Meggers and Evans investigated 15 Aristé phase sites, but glass beads were present at only sites A-10 and A-15. The Mazagão phase was identified north of the Amazon River and south of the Rio Araguarí-Amaparí. Six Mazagão phase sites were investigated, two of which (A-3 and A-4), contained European contact material in the form of glass beads. Meggers and Evans (1957:587) believed that the contact-period Mazagão phase could be as early as 1500 but, based on warfare and colonialism in the area from 1600 to 1630, were unlikely to post-date 1630. They did not provide date estimates for any of the specific sites they investigated.

Aristé Phase Sites North of the Rio Araguarí-Amaparí

Site A-15, Vila Velha, is an urn cemetery excavated by Eurico Fernandes before it was destroyed by village expansion. One urn contained 373 glass beads, a fused mass of glass beads, a stone axe, and seven stone pendants. While most of the beads are now in the collections of the Comissão Brasileira Demarcadora de Limites in Belém, a sample of 13 beads of six varieties were given to Meggers and Evans. During their research, Meggers and Evans (1957: Table C) had access to the entire bead collection and described the 373 beads in their report, separating them into at least 11 varieties (Table 4). In addition, a photograph of most of the 373 beads (Meggers and Evans 1957: Plate 25a) includes three melon beads, raising the number of varieties represented to 12. Two of the 11 varieties identified by Megger and Evans are not described in sufficient detail for all of them to be identified precisely today, however. Drawn bead varieties present in the Smithsonian collections (Figure 5) are oval, translucent blue beads (IIa54) and colorless "gooseberry" beads with white stripes (IIb18). Furnace-wound beads are represented by spherical beads

Figure 3. Glass bead varieties from site R-34, Guyana. Top rows and lower left, from left: If* (n=2), IIa* (n=7), and IIf* (n=1); Bottom center, from left: MPIIa* and MPII* (NMNH cat. nos. A419595 and A419600-419604).

of translucent alabaster glass (WIb5); pentagonal-faceted beads that are colorless (WIIc2), blue (WIIc11), or green (WIIc7?); colorless, blue, and amber "raspberry" beads (WIId); and melon beads (WIIe). Unfortunately, the exact colors and counts by color for some of the beads described by Meggers and Evans cannot be determined. The presence of the gooseberry and furnace-wound beads dates this assemblage to approximately the first half of the 18th century, with comparable beads from well-dated contexts at the Guebert site in Illinois (Good 1972) and the Tradeau site in Louisiana (Brain 1979). There were no white drawn beads at A-15, but low amounts of Sb were detected with XRF in the three gooseberry beads (Table 1), probably in the white stripes.

Site A-10, Montanha da Pluma, is a cave containing burial urns that dates to the Aristé phase (Meggers and Evans 1957:107-108). Sherds from broken urns near the mouth of the cave were intermixed with 12 small IIa12* beads of opaque white glass that average 3.5 mm in diameter and 2.2 mm in length. While small white beads were traded for many years making them difficult to place in time based on their physical appearance, examination of the opacifiers provides some estimate of the age of the beads. XRF analysis of 12 of the white beads found that all were high in Sb (Table 1). White beads high in antimony are common from the late 17th to early 19th centuries (Billeck and McCabe 2018; Hancock et al. 1997; Sempowski et al. 2000).

The Aristé phase extends into the contact period based on the presence of European trade items at some sites. A seriation of burial urn styles places A-10 earlier in time than A-15 (Meggers and Evans 1957: Figure 46). This may not be the case, however, due to the disparate number of vessels at

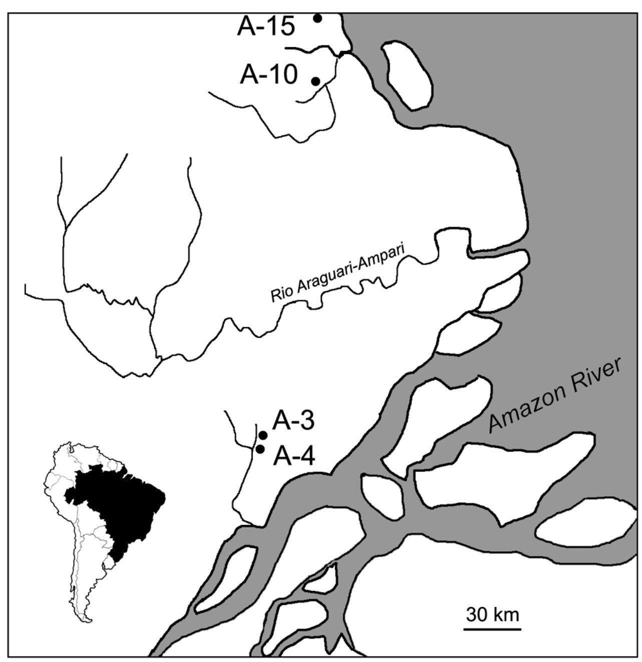

Figure 4. Archaeological site locations in Brazil.

Table 4. Glass Bead from Site A-15, Vila Velha, Aristé phase, Brazil.

Kidd Code	Color and Shape	Average Diameter mm	Average Length mm	Present Count	Count by Meggers and Evans (1957: Table C)
IIa54	Translucent blue, 5PB 2/6, oval	6.8	16.0	1 large	8
IIb18	Colorless with 14 or 17 opaque white stripes, N 8.5/, spherical, "gooseberry"	6.9	8.3	3 large	274
WIb5	Translucent alabaster, N 8.5/, spherical	11.8	9.8	2 very large	5
WIIc2	Colorless, pentagonal faceted	9.9 16.1	8.7 13.4	1 large 3 very large	45 colorless or dark blue
WIIc11	Translucent blue, 5PB 2/6, pentagonal faceted	14.0	11.3	1 very large	
WIIc7?	Green, pentagonal faceted, 8-11 mm in diameter and length			0	8
WIId1	Colorless, transparent, "raspberry"	10.0	8.4	2 very large	26
WIId	Dark blue or amber, "raspberry"			0	
?	Dark blue, small, spherical, 5 mm diameter			0	2
?	Colorless, spherical to oval, 3-4 mm diameter			0	5
WIIe	"Melon" beads; although not described, Meggers and Evans (1957: Plate 25a) illustrate at least three; color cannot be determined from the B&W image			0	0
Total				**13**	**373**

the two sites: only two vessels from A-15 but 24 from A-10 (Meggers and Evans 1957: Table 11). The bead assemblage at A-15 can be dated to the first half of the 18th century. Site A-10 can only be dated to somewhere between the late 17th and the early 19th century, based on the opacifier.

Mazagão Phase Sites Near the Amazon River

Site A-3, the Piçacá cemetery, is a Mazagão phase urn burial site where glass beads were obtained from a single urn by Fritz Ackermann. Meggers and Evans obtained a sample of 109 glass beads apparently from Ackermann, but were unable to record the total number obtained from the urn. The rest of the collection is at a museum in Macapa (Meggers and Evans 1957:51). The glass beads (Table 5; Figure 6) are all of drawn manufacture and consist of 66 opaque white short-barrel beads (IIa12*); eight opaque white spherical beads (IIa13); three transparent turquoise short-barrel beads (IIa32); 13 robin's egg blue barrel-shaped to spherical beads (IIa40); seven robin's egg blue short-barrel beads (IIa41); one opaque shadow blue short-barrel bead (IIa47); two bright navy short-barrel beads (IIa56); three barrel-shaped to spherical gooseberry beads (IIb18); two robin's egg blue beads with three opaque white stripes (IIb56); one robin's egg blue spherical bead with six redwood-on-white stripes (similar to IIbb'2 which has a lemon yellow rather than a white stripe); one short-barrel with a colorless exterior, an opaque white middle layer, and a colorless core (IVa11); one blue, white, red, white, and blue chevron with ground facets (IIIk3); and one colorless, green, red, and white star bead (IVk5). About half of the small white beads (IIa12*), several of the small blue beads (IIa41), one shadow blue bead (IIa47), one large white bead (IIa13), and one gooseberry bead (IIb18) were once glued to an unidentified surface that is still present on one end of the beads. It is not known why this residue is present only on some of the glass beads.

A-3 can be dated by a bead sequence proposed by Marvin T. Smith (1983, 1987:31-33) for Spanish contact

Figure 5. Glass bead varieties from site A-15, Brazil. From left: IIa54, IIb18, WIb5, WIIc2, WIIc11, and WIId1 (NMNH cat. no. A431302).

sites in the southeastern United States. Smith proposed four periods, of which only the third period is relevant here. At site A-3, beads that are diagnostic of Smith's 1600-1630 period are the star beads (IVk5) and the turquoise beads with white stripes (IIb56). Other bead varieties from A-3 that are present in the 1600-1630 framework and other periods are the gooseberry beads (IIb18) and turquoise beads (IIa40). The faceted chevron (IIIk3) is generally uncommon by 1600, but is known to occur in low numbers after that date (Loewen 2016; Smith 1987:33), especially in trade contexts that are not Spanish (Little 2010:224). Smith (1983: Table 1) dates compound seed beads from the southern United States to the 16th and 17th centuries, which likely includes IVa11 from A-3.

Marcoux (2012) has produced a bead chronology for English colonial sites in the southeastern United States identifying the most typical bead varieties assigned to four time periods between 1607 and 1783. A-3 varieties IIa12*, IIa32, IIa41, IIa47, IIbb'2, IIIk3, and IVk5 do not fall into any cluster. Beads attributed to Cluster 1 date to the first half of the 17th century and this typically includes variety IVa11 and occasionally IIa13, IIa40, and IIb56, varieties that all occur at A-3.

XRF analysis identified the opacifiers used in the manufacture of eight IIa13, one IVa11, thirty IIa12*, and three IIb18 beads from A-3 (Table 1). Seven of the medium to large IIa13 beads and one small IVa11 bead were found to be high in SnPb. Sn and low Pb could also be detected in the white stripes of the three IIb18 gooseberry beads. One large IIa13 bead which is a brighter white than the other IIa13s contains Sb and low Pb. All 30 of the IIa12* beads are high in Sb. Overall the smaller beads have Sb as an opacifier whereas the larger beads most often contain SnPb.

By about 1675, white beads of all sizes found at Seneca archaeological sites in northeastern North America are opacified with Sb (Sempowski et al. 2000). Overall, the presence of beads high in SnPb and beads high in Sb suggests the bead assemblage postdates 1625 based on comparative opacifier studies in northeastern North America (Sempowski et al. 2000).

Site A-4, the Valentim cemetery of the Mazagão phase, produced 42 glass beads from a concentration of several fragmentary vessels (Meggers and Evans 1957: Figure 11 and Table B). The collection now contains 38 beads (Table 6; Figure 7). One small bead is missing, along with the fragments of three beads that were described by Meggers and Evans (1957: Table B) as spherical opaque blue beads 5 mm in diameter. The missing blue beads are likely robin's egg blue (IIa40), and the missing small white beads are likely IVa11 since these are the only small white beads represented in the assemblage. Present in the Smithsonian collections are two tubular white beads with red stripes (Ib11), five large spherical white beads (IIa13), one spherical white bead with red stripes (IIb20), two spherical white "flush-eye" beads (IIg3), one long tubular Nueva Cadiz bead (IIIc1), and 27 colorless/opaque white/colorless compound short barrel beads (IVa11).

The IVa11 beads could be easily misclassified as IVa13 (opaque white on colorless glass) since the outer layer on many of the IVa11 beads is thin and these beads are best identified under magnification. Sempowski and Saunders (2001) combined IVa11/12/13 in their descriptions perhaps because of the difficulty in separating these varieties. The compound white and colorless, small to medium, short barrel beads in the IVa11/12/13 group have been reported at sites in

Table 5. Glass Beads from Site A-3, Piçacá, Mazagão phase, Brazil.

Kidd Code	Color and Shape	Average Diameter mm	Average Length mm	Present Count
IIa12*	Opaque white, N 8.5/, with thin colorless outer layer, short barrel	3.3 4.3	2.0 ------	64 small 2 medium
IIa13	Opaque white, N 8.5/-N 8.75/, spherical	4.9 6.3	5.3 6.7	1 medium 7 large
IIa*	Transparent green, 7.5GY 3/6, short barrel	2.9	1.9	1 small
IIa40	Opaque to slightly translucent robin's egg blue, 5B 3/6, 4/4, and 4/6, barrel to spherical	5.2 7.3	4.1 5.7	1 medium 12 large
IIa41	Opaque to slightly translucent robin's egg blue, 5B 4/4-4/6, short barrel	3.3	2.4	8 small
IIa45	Transparent bright copan blue, 2.5PB 6/10, short barrel	2.9	1.5	1 small
IIa47	Opaque shadow blue, 5PB 4/6, short barrel	6.05	3.35	1 large
IIa56	Transparent to translucent bright navy, 5PB 3/8, short barrel	3.0	1.5	2 small
IIb18	Colorless with 11 or 12 opaque white, N 8.5/, stripes, barrel to spherical, "gooseberry"	7.3	6.9	3 large
IIb56	Opaque robin's egg blue, 5B 4/6, with 3 opaque white, N 8.5/, stripes, spherical	8.0	7.7	2 large
IIbb'2*	Opaque robin's egg blue, 7.5B 4/6, with 6 slightly twisted stripes of opaque redwood, 7.5R 3/6, on opaque white, N 8.5/, spherical	8.5	7.1	1 large
IIIk3	Transparent bright navy, 2.5PB 2/8, opaque white, N 8.5/, opaque redwood, 7.5R 3/6, opaque white, N 8.5/, and transparent bright navy, 2.5PB 2/8, faceted barrel, "chevron"	6.8	7.9	1 large
IVa11	Colorless on opaque white, N 8.5/, on colorless, short barrel	3.4	2.4	1 small
IVk6	Colorless, opaque dark palm green, 10GY 4/4, opaque white, N 8.5/, opaque redwood, 7.5R 3/8, opaque white, N 8.5/, and colorless, spherical, "star"	9.0	7.3	1 large
Total				**109**

the 16th (Rumrill 1991: Table 3) and 17th centuries (Bennett 1983:52-53; Blair 2017; Kent 1983: Table 2; Rumrill 1991; Sempowski and Saunders 2001; Wray 1983:42-43). Wray reports compound beads identified as IVa13 as occurring before 1635. Rumrill (1991: Tables 3-5) dates them to his earliest period (1600-1615). Kent (1983: Table 2) dates IVa11 as occurring before 1630, but has them appearing again during 1676-1680. These beads are also present at Fort Orange, 1642-1647 (Huey 1983: Table 3). The flush-eye beads (IIg3) occur from 1575 to the 1630s (Smith 1983:33).

Nueva Cadiz beads typically dominate assemblages from areas of known Spanish contact during the early 16th century, but these beads are also known to occur occasionally in 17th-century contexts in northeastern North America within the colonial spheres of the French, Dutch, and English (Kenyon and Kenyon 1983; Lapham 2001; Little 2010; Loewen 2016; Smith and Good 1982). The Nueva Cadiz bead at A-4 shows little wear or deterioration of the glass suggesting it is not an heirloom and it seems most likely that the presence of this bead is the result of trade during the 17th century.

XRF analysis of 27 IVa11, five IIa13, two IIg3, two Ib11, and one IIb20 bead revealed that all had a high SnPb content (Table 1). The presence of only SnPb-opacified beads indicates a pre-1625 date for the assemblage (Sempowski et al. 2000).

Figure 6. Glass bead varieties from site A-3, Brazil. Top rows, from left: IIa/IVa, IIa13, IIa*, IIa40, IIa41, IIa45, IIa47, and IIa56. Bottom rows, from left: IIb18, IIb56, IIbb'2*, IIIk3, IVa11, and IVk6 (NMNH cat. nos. A431220-431221).

The glass beads from sites A-3 and A-4 have strong similarities to an assemblage of 20,402 glass beads from Dutch Hollow, a Seneca site in New York that dates to ca. 1605-1625 (Sempowski and Saunders 2001, 1:10, Table 3-86). Six of the seven bead varieties at A-4 are also present at Dutch Hollow, only variety Ib11 is absent. There are 13 bead varieties at A-3, 11 of which are present at Dutch Hollow. Varieties IIa32 and IIbb'2* at A-3 are not present in the Dutch Hollow assemblage, but very similar varieties (IIa31 and IIbb25) do occur there. The similarity of the A-3 bead collection to the 1605-1625 Dutch Hollow beads suggests that sites A-3 and A-4 are likely contemporary. The Dutch Hollow beads are thought to be the result of Dutch trade (Sempowski and Saunders 2001, 3:689), and these same beads at A-3 and A-4 are likely to also be the result of Dutch trade. The location of sites A-3 and A-4 in the early 17th century would primarily have been near Dutch settlements (Meggers and Evans 1957:556-562). These had been established north of the Amazon River by about 1600, but most had moved further north by 1630 to what is now French Guiana or further south along the Brazilian coast centered near Recife (Meggers and Evans 1957:562).

Overall the beads from A-3 and A-4 are likely the result of Dutch trade with indigenous communities. The presence of flush-eye beads (1575-1630), a Nueva Cadiz bead (present in low numbers after 1575 and into the 1600s in non-Spanish areas), and opacifiers that predate 1625 indicate that A-4 dates to between 1575 and 1625. The similarity with the Seneca assemblage at Dutch Hollow (1605-1625) and the presence of Dutch settlements in the area north of the Amazon after 1600 indicates that the assemblage can be more tightly dated to between approximately 1600 and 1625. Nueva Cadiz beads and faceted chevrons were present in glasswork waste deposits dating to the 1590s in Amsterdam soon after Venetian glassworkers arrived in the Netherlands (Baart 1988; Karklins 1974:75; Little 2010:226). If the Nueva Cadiz bead at A-4 was made in Amsterdam, it must date to the end of the 16th century or later based on the arrival of Venetian glassworkers. The association of a Nueva Cadiz bead with the beads at A-4 that are likely the result of Dutch trade adds to the growing body of evidence that Nueva Cadiz beads are associated with Dutch trade and Dutch manufacture in the early 17th century. Nueva Cadiz and chevron beads have also been found in early 17th-century

Table 6. Glass Beads from Site A-4, Valentim, Mazagão phase, Brazil.

Kidd Code	Color and Shape	Average Diameter mm	Average Length mm	Present Count
Ib11	Opaque white, N 8.5/, with 6 redwood stripes, tubular Opaque white, N 8.5/, with 8 redwood stripes tubular	2.6 3.0	7.5 6.8	2 small 5 large
IIa13	Opaque white, N 8.5/-N 8.75/, spherical	6.8	6.9	0
IIa40?	Opaque blue, round, 5 mm in diameter; not present in the collection but three fragments are described by Meggers and Evans (1957: Table B)			1 large
IIb20	Opaque white, 5GY 7/1, with 3 redwood stripes, spherical	7.1	6.5	2 large
IIg3	Opaque white, 5GY 7/1, with 3 eyes containing a redwood, 5R 4/6, star on opaque white on opaque blue, 10B 3/4, spherical, "flush-eye"	8.0	6.7	1 large
IIIc1	Transparent blue, 2.5B 3/6, on opaque white, N 8.5/, on transparent blue, 2.5B 3/6; square cross-section, long tube, Nueva Cadiz similar to type 52 in Smith and Good (1982)	6.2	73.9	22 small
IVa11	Colorless on opaque white, N 8.5/, on colorless, short barrel; a few beads have lengths that are almost equal to the diameter.	3.5 4.4	2.3 2.8	5 medium
Total				**38**

glassmaking contexts in France and there are likely to have been several sources for these beads in northeastern North America (Karklins 2019). How long Nueva Cadiz beads continued to be made is debatable, but they have been found in 17th-century contexts in northeastern North America and there is evidence that they may have been made possibly as late as 1710 (Karklins and Oost 1992:27). Earlier, in the 16th century, Nueva Cadiz beads were most likely only made in Venice. A-3 is more recent than A-4 based on the presence of beads opacified with Sb as well as SnPb, placing the site after 1625. Since the Dutch left the general area of the site in 1630, A-3 likely dates no more than a few years after 1630, and likely within the time frame of 1625 to 1650.

MEGGERS AND EVANS' INTERACTIONS WITH BEAD EXPERTS

In their report on the Amazon investigations, Meggers and Evans note that they sent the beads from A-3, A-4, and A-15 to bead experts for date estimates. They were disappointed in the results and stated that "in spite of the

Figure 7. Glass bead varieties from site A-4, Brazil. Top rows, from left: Ib11 (6 stripes), Ib11* (8 stripes), IIa13, IIg3, IIb20, and IVa11. Bottom row: IIIc1 (NMNH cat. nos. A431223-431224).

fact that the beads include distinctive types, no more precise date can be attributed to them... [and did not produce] evidence to indicate what types of beads were traded first and by which Europeans in South America" (Meggers and Evans 1957:97). They thought the dates assigned to specific bead types by the North American bead researchers were too recent for the sites in the Amazon: "Europeans were trading in the area from A.D. 1500 onward, almost 150 to 200 years earlier than the dates assigned to the same types of trade beads in the North American area" (Meggers and Evans 1957:97). Based solely on a review of historical records, Meggers and Evans (1957:587) believed that sites of the Aristé phase could date from 1500 to the 18th century and sites of the Mazagão phase could date from 1500 to ca. 1630.

Meggers and Evans report does not provide the dates proposed by the experts who are identified as Arthur Woodward, Glenn A. Black, and Kenneth Kidd (Meggers and Evans 1957:xxviii, 588), but the context suggests that the bead assemblages were dated 150 to 200 years after 1500, in the range of 1650-1700. It appears that Meggers and Evans assumed that the glass beads were from archaeological sites that date to soon after initial contact with Europeans in 1500. Based on this assumption, they concluded that the same bead varieties could be traded more than a century later in North America than in South America, and additional studies were needed to establish a glass bead chronology. It is possible to reconstruct the ways in which Meggers and Evans came to the erroneous conclusion that the North America chronology could not be applied in South America by examining their archived correspondence and notes related to their interactions with the bead experts. The correspondence shows a detailed assessment of the age of a specific bead only once and most of the letters tend to provide only general assessments of the age of the assemblages.

Evans sent a sample of beads from A-3, A-4, and A-15 to Arthur Woodward on 21 February 1951. Woodward replied on 27 February that he would date the beads to the late 17th to early 18th centuries, and that he would tentatively date most of the bead types to after 1650 (National Anthropological Archives [NAA], Meggers and Evans Papers, Series 3, Box 44). Evans then sent the bead samples from A-3, A-4, and A-15 to Glenn Black on 23 March 1951, and Black replied on 28 March that the beads most likely date to shortly after 1650 (NAA, Series 3, Box 44). Black wrote again on 11 April that he did not believe the beads could be linked to specific colonial presences of the Spanish, Portuguese, Dutch, French, and English near the mouth of the Amazon because most beads were derived from the same source in what is today Italy. Black was skeptical about the ability to use glass beads to date bead assemblages, which likely was a contributing factor in Meggers and Evans' conclusion that the North American bead chronology was of little value in dating South American archaeological sites. Black's opinion that beads could not be successfully used to date archaeological sites is surprising given how beads have become one of the most reliable dating tools used today.

Evans also showed the beads to Kenneth and Martha Kidd on 20 March 1952 and notes that they attributed A-3 and A-4 to the period prior to 1650-1675, and said that the beads from A-15 dated to a later time period. Evans's notes do not provide further details regarding the suggested time range for A-15. Some of the correspondence with John Witthoft, a bead expert who worked on Pawnee glass bead assemblages from Nebraska, is also in Evans's records (NAA, Meggers and Evans, Box 24). Witthoft replied to Evans in a letter dated 29 January 1952 that the wound faceted beads depicted in a figure from an Aristé phase site sent to him by Evans are almost an "index fossil of the 1720-1750 period in North America." While the correspondence does not identify the site, Witthoft can only be referring to the beads from site A-15, which is the only site that has this bead type. Evans replied on 3 February 1952 that this date was not possible because several European nations established colonies near the mouth of the Amazon in the 1500s and that by the late 1600s archival records indicated that the Indians in the area were being actively removed. Evans' expectations that indigenous communities were not present in the area, based on his knowledge of historical records, further led him to reject the applicability of using the North American bead chronology to date sites in South America.

The present analysis dates the beads from A-3 to ca. 1625-1650, A-4 to ca. 1600-1625, and A-15 to ca. 1700-1750. One problem with the age estimates from Woodward and Black is that they did not break down their dates by specific sites. Instead, Woodward described the aggregate date range for all three sites as being from the late 17th to the early 18th centuries, or after 1650. The findings of this study have yielded earlier dates for A-3 and A-4 than Woodward's assessment which placed all of the beads in a post-1650 context, but his early 18th-century estimate does match this study's date estimate for A-15. Black believed that all three assemblages jointly postdated 1650 but was pessimistic about the reliability of bead assemblage to establish a time frame for archaeological sites. Black was, however, correct in his post-1650 date for A-15, but the current study dates sites A-3 and A-4 to a pre-1650 time period. Kenneth and Martha Kidd dated the three assemblages individually, and their dates are the closest to those provided by the present study. They placed A-3 and A-4 in a time frame prior to 1650-1675, and described A-15 as being "late." Witthoft dated A-15 to 1720-1750, and his findings are in agreement with this study. In hindsight, the age estimates for the bead assemblages from 1950s bead experts have been modified by a few decades by the present study of bead varieties and XRF, which has clearly benefitted from the past 60-plus years of advances in glass bead research.

CONCLUSION

The glass bead chronologies developed in North America and elsewhere for beads made in Europe can be effectively applied to archaeological sites in South America and other areas of the world that were subjected to European colonial expansion and trade. In effect, the North American bead chronologies provide a global chronology for glass beads derived from Europe, with some degree of regional adjustment. Meggers and Evans' investigations in Guyana and Brazil obtained bead assemblages from nine sites that date from the early 17th century to the mid-20th century. In the present study, the bead assemblages from South America were dated based on changes in bead stylistic attributes and manufacture methods, including changes in the opacifiers used in making white drawn beads.

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BOOK REVIEWS

The Glory of Beads: The Rise and Fall of the Società Veneziana per l'Industria delle Conterie.

Nicole Anderson. Self published (thegloryofbeads@gmail.com), Dexter, MI. 2017. 230 pp., 81 figs., ISBN-13: 978-0-692-88200-9. $65 (paperback).

Author Nicole Anderson shares her passion for the history of the Venetian seed bead consortium, Società Veneziana per l'Industria delle Conterie (SVC), in this well-researched volume. The introduction takes the reader through the ups and downs of doing research as a foreigner in Italy, and the story of how the book came into being is an inspiring lesson in persistence.

Anderson faithfully records the human side of the successes and misfortunes of the glass-bead industry in Murano and Venice. The book is far from a dry compilation of facts as she weaves many small but poignant items into the narrative; e.g., the requests for work permits for children from destitute families.

The book is lavishly illustrated with photographs from the late 1800s to mid 1900s of the workers and equipment used in the glass and bead industry, and also of the items – such as fringe – that were created with the beads. One small criticism of the photos is that few are dated, but the undated ones are clearly from the late 1800s to early 1900s era. This omission was due to lack of provenance for the photos, not to an oversight by the author. The book also lists numerous reference materials and includes a glossary.

The first five chapters provide background information about the history of Murano, glassmaking, and beadmaking.

Chapter 1 *Murano in Retrospect* gives a brief history of the island and the origin of its glass beadmaking industry, which by tradition (if not by actual documentation), began in the late 1200s. The waxing and waning of the fortunes of Venice and Murano are described, including the heydays of the late 1800s to early 1900s, and ending with the struggles due to increasing global competition after WWII. Although glasswork of all types is still found today on Murano, it is, sadly, a shadow of its former glory.

Chapter 2, *The Chemistry Department*, presents the reader with historical information about the *compositionatore*, or glass technicians, who formulated and made the glass needed for bead production. Readers both with and without a technical background will appreciate the empirical nature of glass technology and how it advanced by trial and error up to the modern era.

Chapter 3, *The Star of Murano*, discusses the 17th-century invention of *avventurina*, aka aventurine or goldstone. The hard-to-reproduce process resulted in success for only 5% of the batches, even with pleas for divine intervention. Amazingly, one large successful batch of *avventurina* made in 1901 was used by the SVC beadmakers for almost 100 years.

Chapter 4, *Producing Glass Cane*, describes the process of producing perforated as well as non-perforated cane for the production of *conterie* (seed beads), stringers and millefiori slices for lampwork, and *rosetta* cane for chevron beads. Until the process was mechanized in the 1980s, cane was drawn by two runners (*tiradori*) who sprinted up to 100 yards, stretching the hot glass into its final reduced diameter.

Chapter 5, *The Art of the Venetian Lampwork Bead*, is another brief history, this time of Venetian lampwork beads, which date from 1528. This short chapter highlights the role of the women (*perleri*) who largely worked at home and formed the backbone of this cottage industry.

Chapters 6-10 are more specific to the production and end use of glass seed beads.

Chapter 6, *Creating Conterie Beads*, is the technical meat of the book, as it describes bead production by the SVC. Glass cane was transformed into seed beads in an eight-step process, followed by stringing and packaging. The author obtained and reprinted photographs of the factory workers and equipment thereby very dramatically bringing the entire process to life.

Chapter 7, *Children in the Workforce*, is a poignant description, with historical records, of the conditions that forced children from as young as 8-years-old to start apprenticeships or to seek day work in the glass factories. Children were illegally employed through the 1960s, often having to hide from inspectors to avoid losing their jobs.

Chapter 8, *The Venetian Impiraressa*, is a gripping chronicle of the life and work of the women who strung seed beads for the SVC. The women performed the critical last step in preparing seed beads for sale but lived and worked in grinding poverty. The story of the *impiraressa* is one of both exploitation by the glass industry and personal devotion; their wages often supported an entire extended family.

Chapter 9, *The Eye of the Needles*, expands the cast of seed bead characters with the life story of Aldo Bullo, who produced the hair-thin needles used by the *impiraressa*. Bullo invented his own process for making needles and developed a profitable side business, run by his wife, all the while working full time as an engineer for a Venetian firm.

Chapter 10, *The Gems of Giovanni Giacomuzzi*, is a short chapter detailing his invention of golden-yellow glass based on uranium salts. The glass was used to make seed beads that decorated specialized ecclesiastic and other cloth (usually velvet) items, mimicking the appearance of gold encrustation.

Chapter 11, *The Rise and Fall of the Società Veneziana per l'Industria delle Conterie (1898-1992)*, is the longest and last chapter of the book. The reader, equipped with the details from the previous chapters, is treated to the specific history of the SVC which was a merger of 17 separate companies hoping to insure their survival after the global depressions of the late 1800s. Like the preceding chapters, this one is supplemented with period photos and translated excerpts. The SVC built an immense new factory and warehouse structure for manufacturing beads, as well as beaded items like flowers for funeral wreaths, for customers on six continents. The company suffered many ups and downs and was finally put out of business by lower-cost competitors in the early 1990s.

In sum, this book is an informative, if bittersweet, window into the lives and times of the Muranese and Venetian glass beadmakers, together with the technical and historical development of glass and seed bead production. The book is certain to greatly enhance one's appreciation of Venetian glass seed beads and the items that were decorated with them.

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La cartelle veneziane del Museo di Storia Naturale di Milano.

Giorgio Teruzzi, Chiara Colombo, and Irene Mineo. Società Italiana di Scienze Naturali and Museo di Storia Naturale di Milano, Milan. *Natura* 108(2). 2018. 172 pp., 174 color figs. € 20.00 (paper cover).

Volume 108(2) of the journal *Natura* provides a substantial introduction to the topic of glass bead production and trade overseas with copious full-size images of a wonderful assortment of historic sample cards of Venetian glass beads from the ethnic collection of the Museo di Storia Naturale di Milano, which were accessioned within the last 20 years. Mostly produced on Murano as goods for trade and barter, the earliest card shown possibly dates back to 1898.

The front cover depicts the classic method of making a glass bead by hand on a mandrel, glowing in the lampwork flame, in front of a hood-shaped baffle or screen to contain the heat, with a selection of millefiori cane slices on the work surface ready to be placed around the sides of the bead.

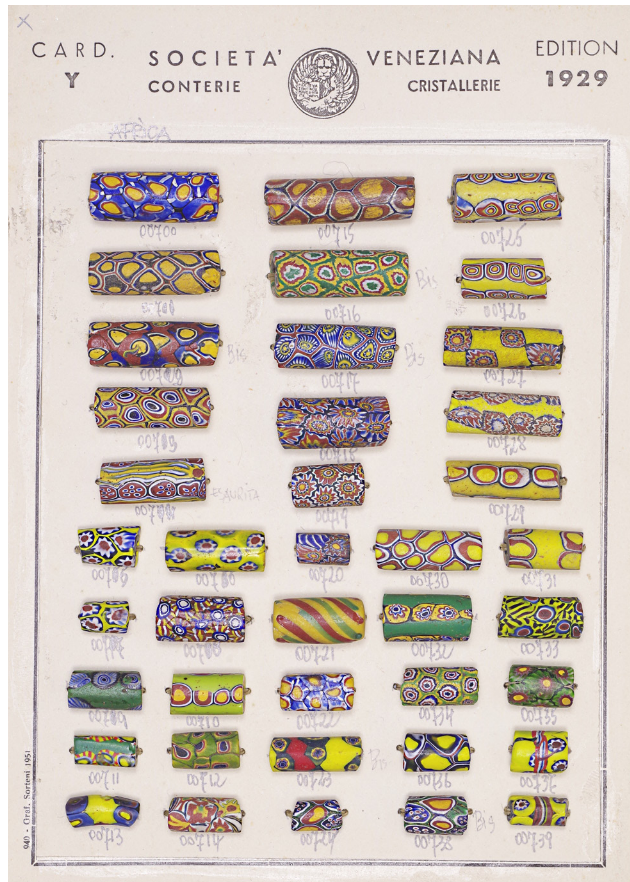
The first dozen or so pages explain the whole industry and provide an introduction to the illustrated collection of the sample cards themselves. For enthusiasts, just enjoying such a feast of styles and designs is always exciting and inspiring though the information may not include date and place of manufacture and whether the designs are new or repeats of beads in already popular patterns. So it still involves detective work for research purposes.

> Study of the beads, and in particular determining their original site of manufacture, is often not easy to carry out: in fact, despite the beads being shipped over enormous distances, they were not stamped with trademarks or given identificatory punches similar to those often present on objects made out of ceramic or silver (p. 5).

The text is presented in Italian in the left hand column with text paralleled in English to the right. Generally this works even though there are a few images that need captions in both languages.

In some cases I made use of an old pocket Italian/English dictionary to try to check exact vocabulary; for example *Cartelle Campionario* translates as "sample cards" and *magazzino* means "warehouse."

In a few instances "pearl" is still used to designate a glass bead, which might be confusing for a curious member of the public if they are not already familiar with beads. On page 7 there is mention of "Polish beads" which is new to me; I suspect that "fire polished" may have been intended. On page 9, lampwork is described as forming a bead round a copper tube rather than a solid mandrel. Has this always been the Venetian method?



A listing and description of the plates depicting the cards appears on pages 14-29. Each entry (in Italian) provides the museum inventory number, dimensions, date, trade destination, notes (describing any trademarks, wording, numbers for the samples, etc.), and figure number. The 174 sample cards are shown on the pages that follow. They seem to have been ordered by museum catalog number but not necessarily chronologically or numerically.

Page 30, also not translated, provides a listing of the cards sorted into categories, giving the year dates that are stamped or written on them, and the museum inventory number. The categories are: sample cards of production or warehousing; cards with the trademark of J.W. Jaeckel & Co.; cards indicating names of general destinations;

cards with names of specific destinations within Africa, Asia, Oceania, Central America, South America, Europe; cards without any specific destination; multiple cards; and manufactured goods.

Consequently when you start to look at the illustrations it may be confusing to try to find the matching description for a particular bead sample card. Nevertheless gradually we begin to get a better picture of the Venetian beads that were made by hand in such quantities and loved and traded around the globe.

As the largest publicly owned collection in Italy, the cards depicted in this book represent "a unique testimony of the copious output of a once great industry – namely glass-bead making – that produced artefacts linked to the traditions of peoples on every continent" (p. 5).

For all those who love, collect, and research Venetian beads, this book is most recommended for its images, the industry it celebrates, the history it records, and the connections it demonstrates.

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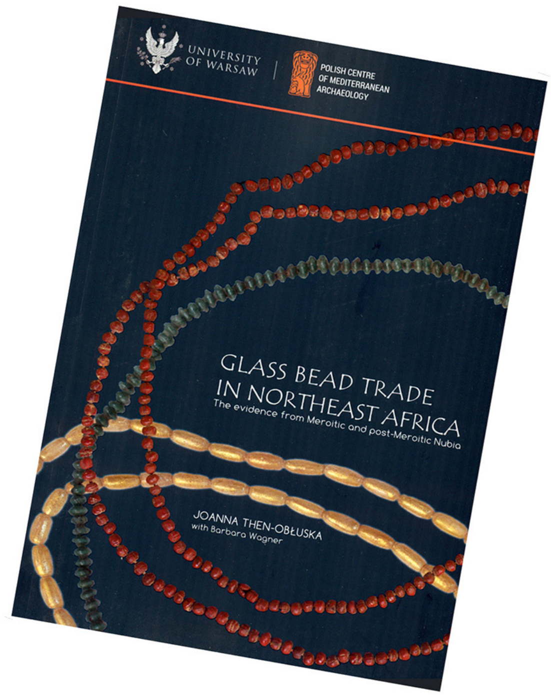
Glass Bead Trade in Northeast Africa: The Evidence from Meroitic and Post-Meroitic Nubia.

Joanna Then-Obłuska, with Barbara Wagner. Polish Centre of Mediterranean Archaeology, University of Warsaw, PAM Monograph Series 10. 2019. 316 pp., 32 color plates, 65 color figs., 11 B&W figs., 31 tables. ISBN-13 978-83-235-3899-8. 180 zł (paper cover) & 160 zł (PDF).

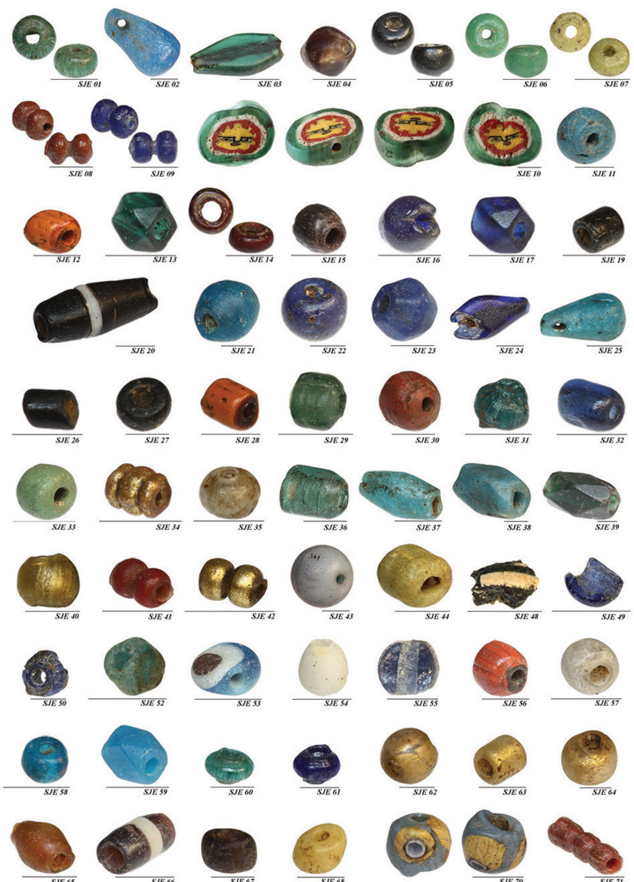
As the title proclaims, this book undertakes to determine the routes by which glass beads found at archaeological sites in the Nubian region of Sudan arrived there during the Meroitic and Post-Meroitic periods. This is accomplished by comparing the types of beads recovered with those from other sites ranging from the eastern Mediterranean to South Asia. In addition, information is provided concerning the techniques used to produce the beads, the chemical composition of the glasses used in their production, and how they were utilized as ornaments. The author is well suited to the task, having studied the beads recovered from numerous sites in Nubia.



Following a brief Introduction, Chapter 1 discusses Nubia and its history during the pre-Islamic period. Centered at Meroë, at the confluence of several trade routes, the Meroitic Kingdom existed from around the 3rd century BC to the 3rd century AD. Its early phase corresponds to the Ptolomaic period in Egypt while the later part equates to Roman times. It was conquered by the Kingdom of Aksum in the early 4th century, marking the beginning of the Post-Meroitic period which lasted until the middle of the 6th century.

Chapter 2 provides examples of the various ways beaded ornaments are depicted in works of art in the region such as statues and bas-reliefs followed by an enumeration of the uses of actual beads found in burial contexts. While most beads and pendants comprised personal ornaments such as necklaces, bracelets, and earrings, others adorned garments and accessories, wooden boxes, and, on occasion, animals and their trappings.

The beads discussed in this book come from four major museum collections. These, as well as the sites involved, are discussed in detail in Chapter 3. The next chapter describes the various morphological categories of the beads under study. The main groups are drawn and segmented; drawn and cut; drawn and cut gold-in-glass with finished ends; drawn, cut, and rounded; mandrel wound; folded; joined; mandrel formed; and rod pierced. Extensive tables provide details about all the specimens.



Chapter 5 discusses the chemical composition of the various beads as determined by laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS) analysis. This section is supplemented by several lengthy tables which provide compositional data. A discussion of the provenience of the various glass groups and sub-groups concludes the chapter. Chapter 6 uses the compositional data to determine the chronological position and likely source of the beads under study. Egyptian glass was found to comprise the bulk of the specimens, but Levantine glass, as well as that produced in South Asia, is also present.

Chapter 7, the crux of this book, delves into various aspects of trade contacts in Northeast Africa, concentrating on the bead trade in Nubia. It not only deals with trade hubs, routes, and operators, but touches on trade factors and market demand, market and import awareness, and a number of other related subjects, including Nubian imports and exports, as well as the global market and early Byzantine fashion. Chapter 8 presents concluding remarks.

A Catalog of the bead and pendant types discussed in the book follows. This presents excellent macro color images of each type coupled with descriptions, including glass type. This in turn is followed by a section entitled Parallels which provides images of related bead types. A substantial References section concludes the volume.

This volume presents much new data on Nubian beads and is the first study to provide evidence of the presence of beads of Egyptian, Levantine, and South Indian/Sri Lankan glass in Nubia. While some of the contents may be too technical for the average bead enthusiast, those studying or collecting pre-Islamic beads will surely find this handsome and well-written book of interest. Likewise, the section on glass chemistry will be welcomed by those aiming to identify bead sources.

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BEADS: Journal of the Society of Bead Researchers

CONTENTS

2019 **Vol. 31**